GAS JOURNAL

LIGHT ✂ HEAT ✂ POWER ✂ BYE-PRODUCTS

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Editorial Notes.

A Good Character.

In the gas industry we cannot dissociate the Chairman of the London Section of the Society of Chemical Industry (Mr. W. J. A. Butterfield, M.A., F.I.C.) from the official position he occupies as one of the Gas Referees. Recently he inaugurated his tenancy of the former office with an address, the first part of which we publish in this issue of the "JOURNAL." The independence, impartiality, and courtesy with which he deals with all matters appertaining to the latter office add (in the eyes of those in the gas industry) weight to the address. The combination of offices, and the fact that the gas industry is of large fundamental importance to the chemical industry, are sufficient reasons why he should have chosen as his subject a survey of the affairs of the former. It was a good story he had to tell; and its excellence and value are burnished by the fact that those who heard it and those who will read it are aware that every statement it contains is supported by continuous official record, which constitutes a large store of unimpeachable information. Every responsible individual in the gas industry will also regard it as highly encouraging to his efforts, and an acknowledgment, based on competent judgment, of honest endeavour and material success in rendering service to the country. Whether as Chairman of the London Section of the Society or as a Gas Referee, Mr. Butterfield may be sure that the recognition he has made will not have any rest-and-be-thankful effect, but will act as a spur to even better accomplishment.

There is very little in the address of a controversial nature. It is mainly composed of valuable authoritative fact and compilation, to which Mr. Butterfield must have devoted much time, in order to illustrate the expansion of the services of the industry during its long history, and to extract from the data its successes in the realization of progress. A peculiar thing is that while all this is so apparent to one who has lived long in official and supervisory contact with the industry, there should exist, in political circles and among the people generally, such vast ignorance as to the enormous value of those services and successes. We are sometimes almost tempted to think that nothing would better bring due recognition of the national importance of the industry than a deliberate break in the observation by it of the old tradition (well established, as the address tells us, within three years of the inception of gas supply) that the service must be maintained at all costs. If carbonization of coal suddenly stopped, and the supply of the primary and secondary products ceased, then the resulting hullabaloo would be more effective than all attempts at peaceful conviction that the industry is a national asset, a public utility of no mean importance, and indispensable. In concise language, Mr. Butterfield tells of the fidelity of the industry to its tradition and obligations as to maintenance of supply during the perilous days and months of the general strike and coal stoppage. There are three things which particularly strike him about the work of the industry during that period—the first is its preparedness in respect of raw material; secondly, the harmony and loyalty which it had inspired in all ranks and grades of its staffs (which devotion to duty he attributes in no small measure to the system of co-partnership, and, we would add, the cultivation in other ways of good relationships); and, thirdly, the remarkable degree to which, under the therm system, the industry maintained unimpaired its declared calorific value. We have in the address the statement that there is definite information from independent official gas examiners as to the calorific value of about 71·5 p.ct. of the gas supplied by authorized gas undertakers in Great Britain throughout the general strike and the coal stoppage. As regards 70 p.ct. of the gas thus tested, the calorific value was maintained unimpaired throughout that time; as regards 20 p.ct., the average deficiency in any quarter was less than 5 p.ct. Therefore, of the 71·5 p.ct. of the gas sold and tested officially, only 10 p.ct. in any quarter of that troublesome year was more than 5 p.ct. lower in average calorific value than it would have been in normal times. That is a fine testimonial to have on record; and it is, as Mr. Butterfield remarks, a matter for congratulation to the members of the Society of Chemical Industry that one of the public utility services, which is fundamentally a chemical industry, comported itself so well as the figures indicate during the industrial turmoil of 1926. It is difficult to envisage the hardship and misery which would have ensued had the gas supply failed even for a day.

But from abnormal to normal times. It is shown by the address that not only is continuity of supply well served by the industry, but during the past five years no quarter shows anything but a very small proportion of the gas which is tested to have been supplied at an average calorific value below the declared one. The data given are remarkable evidence of this. Even many small undertakings, whose supply varied greatly in calorific value a few years ago, are now distributing gas of much more consistent value, which is therefore adapted to give a greatly enhanced service and better satisfaction to the consumer. From this Mr. Butterfield rightly deduces that the application of the provisions of the Gas Regulation Act to the comparatively small undertakings has been justified.

In and about 1920, there was some doubt as to whether the Act would not operate rather harshly on the smaller undertakings; but experience has demonstrated the fact that quality of service has been raised, which proves that latent possibility has been given active existence to the advantage alike of community and industry.

There are piquant comparisons and suggestions in the address which will not be altogether to the liking of those who are responsible for the conduct of the electricity industry, whose envy of the gas industry does not abate with all the Government have done in imposing upon them new controlling machinery, and the compulsory spending of millions in concentrating, as rapidly as possible, its generation plant, and in providing an enormously costly transmission grid over the country, for all which somebody has to pay. If there is another war, the superstations will form objectives for raiding bombing machines. The grid, which is to be hoisted in the air on poles, Mr. Butterfield does not find consistent with the development of aerial navigation, to which it will be a source of new danger. The grid, by the way, is theoretically being provided largely for the purpose of supplying rural areas, although there has been no investigation to ascertain whether it would not be cheaper to provide them with gas transmitted at high pressures from the larger works through the cheaper conveyance of small steel tubes laid underground, and therefore dangerous to no one, and no disfigurement to the landscape. By means of the gas thus supplied, farmers, country industries, and mansions could generate their own electricity, or small stations could be erected for the purpose with no question of transporting any other fuel but gas for use in generation. Such economic considerations were by-passed, in order that pompous and autocratic decision might be maintained inviolate. Glancing at other matters, it is not only in respect of a greater fuel utilization efficiency, with the provision of several needs for the well-being of the manufactures of the country, that the gas industry exceeds the electricity industry in its services. There is the freedom of its supply from breakdowns. It also makes a smaller call upon the capital resources of the country relatively to the service it renders than either the railways or electricity supply. Another economic consideration is that gas-works contribute much less to the smoke and dust of our cities than do electricity stations.

Without financial aid from any Government during a century and more of existence, the gas industry has waxed in strength and service continuously. By remarkably interesting diagrams, and in the address itself, Mr. Butterfield presents data which are worth careful study. They cover the period of general electricity supply in the country. Dividing the years since 1882 into three periods, we have this notable fact: From 1883 to 1897, the sales of gas increased each year on the average by 3618 million c.ft.; from 1898 to 1912, by (as nearly as possible) 5000 million c.ft.; and in the fourteen years from 1913 to 1926, by no less than 5892 million c.ft. The figures demonstrate the constant expansion that has been going on despite competition, and the increase is due not only to new consumers but to the growing use per consumer. It is true the rate of average annual increase was reduced in the last-named period, but that was owing to the great upheaval caused by the war and by the industrial depression which succeeded it. But the last two or three years have shown a quickening of the rate of increase; and the signs are that this is continuing. In tables and diagrams, Mr. Butterfield has introduced much valuable information as to the approximate equivalent in therms of the cubic feet of gas sold, and to how many units of electricity those therms correspond on potential heat development. It will come as a surprise to many to learn that the total number of units of electricity sold in Great Britain is, on the heat unit basis, not yet equal to the sale of gas at the time of the passing of the first Electricity Act 45 years ago. It is also useful to learn that, for every additional unit of electricity which people have bought in the last three years, they have increased their purchases of gas by the heat equivalent of over two-and-a-half times that of electricity. "It is not a case of electricity supply gradually improving its position relatively to gas supply; when the two are put on a comparable basis as distributors of potential heat, electricity is seen to be falling more and more behind gas in the esteem of the community."

In this address, Mr. Butterfield has rendered invaluable service to the gas industry; and the facts which he presents are worthy of the widest possible publicity. It all deals, however, with what the industry has done. We are proud of the achievement. But there is no intention of sitting idle and contented. On the contrary, the industry is bringing more and more talent to bear upon its fortunes. Accompanying the work of the engineer is that of the chemist and the physicist. Their joint endeavours will, with time, produce those economies and efficiencies in gas production, distribution, and utilization which will result in greater and greater progress in the industry's service to the country, and "stimulate the growth and prosperity of other branches of the chemical industry."

Dr. Travers in Critical Mood.

The Western Junior Gas Association were recently addressed by Dr. M. W. Travers, F.R.S., on "The Problems of the Near Future." Some of those with which he dealt appear to be actually present rather than prospective. We are pleased to note that, at the outset, our friend admits that his acquaintance with the gas industry covers a period of only five years, during which he has devoted himself to the study of certain special problems, remaining totally ignorant of many subjects which are of the greatest importance to the men engaged in the industry. This admission in some measure protects Dr. Travers from criticism regarding certain of the earlier features of his address. He tells us that in it he has chosen to deal in a critical manner with what he considers to be weak points in our armour. We are pleased; and more so because the "critical manner" happens also to have its weak points. We must take Dr. Travers as a friendly critic, not too well-informed in respect of some modern performances in gas application—those, for instance, which are outside the special problems to the solution of which he has been giving scientific attention during the past few years.

The first two weak points to which he directs attention are found in the statement: "I think you are too apt to "look upon the manufacture of gas from the point of view "of the manufacturer of gas rather than from that of the "consumer, and to suppose that the consumer can be "induced by the use of propaganda to continue to take "what you find it convenient to manufacture in larger "and larger quantity." We do not see that there is any particular weakness in a supposition of this kind, when it is corroborated by the fact that the demands of the consumer necessitate the manufacture of gas in "larger and larger quantity." He also says: "You have cer- "tainly made good use of the fact that circumstances "have forced the domestic user to consider convenience "rather than taste, without, I think, paying sufficient at- "tention to the fact that in many respects electricity gives "even greater advantages to the seeker after convenience "than does gas." We are inclined to think, as a result of extensive experience, that convenience and taste are not the only considerations that matter in gas and electricity trading. Economy and relative efficiency—efficiency in respect of utilization, work done, and time occupied—also have a part. We cannot compel people to buy our commodity; but they do buy it, as the official statistics show, in increasing quantities and at, this last few years, an accelerated rate. Again we cannot admit that much too much in the way of developing appliances for the use of gas is being left to firms "outside" the industry. The major part of the appliances for the use of gas are made by firms with an association with the gas industry extending in some cases to more than half-a-century. And, what is more, many of them have gas technicians of high standing on their staffs, and men who have had wide and practical experience in connection with gas production and applications. As for Dr. Travers' criticisms of the gas oven, there are over 8 million gas cookers in use in this country. That alone is substantial testimony to economy and efficiency in use. Those ovens have been

adopted not because they work inefficiently, but because the users find them working more efficiently and less expensively than the solid fuel heated oven or the electric oven and hotplate. It may be that some people do burn the bottoms of cakes in the gas oven, and that they refuse to brown on top. But people use ovens differently, and Dr. Travers' experience is certainly not that of ourselves and many consumers of whom we know. It is, indeed, difficult to believe that such experiences would have gained for the gas cooker the popularity to which numerical adoption testifies. Burnt cakes and underdone cakes can be obtained just as easily in ovens heated with solid fuel or electricity; such things depend upon the operator rather than upon the form of oven. "Is it impossible," asks Dr. Travers, "to find some means of distributing the heat more uniformly in the oven, and allowing less heat and less waste gas to escape into the kitchen?" Our leading manufacturers can show Dr. Travers ovens that are on the market which demonstrate actuality in respect of the proper distribution of heat in the oven, and negative the idea of impossibility. We saw a batch of bread come out of a domestic gas oven the other day which for attractive and uniform browning and excellent baking could not have been beaten by a leading bakery.

Dr. Travers is no more happy with the gas-fire than with the gas-cooker. He is painfully candid. He says: "Frankly, I hate a gas-fire; for if I spend an evening "in front of one, I suffer—and it is a common experience "—from trouble akin to the evil effect of sunburn." It is a strange thing that this should be the effect on Dr. Travers and his friends, seeing that the greater part of our working life has been spent in rooms heated by gas-fires from autumn to spring; and we have not yet suffered from the torture of which Dr. Travers speaks. The gas industry's records of year-by-year increases of gas-fire connections and outputs by our gas-fire makers indicate that the gas-fire is not an abomination in the eyes of the public, nor is it "hated" by them; their eagerness to secure them is at times an embarrassment to those undertakings who cannot secure the services of a sufficient number of qualified fitters. However, we commiserate with Dr. Travers. It seems that it is his legs which are usually attacked; and he would have gas-fires raised from the ground. His "understandings," we take it, are usually covered when he sits in front of an ordinarily placed gas-fire; while the result of raising the fire on legs would be that he would, when seated, expose his face to the "evil effect" of which he speaks. We prefer the gas-fire to remain in its present situation, and for more reasons than the one that most existing houses are constructed in respect of flues in a manner which easily accommodates the present types of fire.

We are also told by Dr. Travers that radiant heat does not suit everyone; and he confessed, in closing the discussion, that he is a pronounced "convectionist." We wish him happiness. The medical fraternity, on the other hand, are favourably disposed to radiant heating. We do not mind a little convected heat ourselves; but there was a time when there was rather too much of it from gas-fires, and for long years this did them no good—the general public not being of the same way of thinking as Dr. Travers. Had they been, what an enormous amount of trouble the gas industry would have been saved! The men of the industry are not likely to be converted by what our friend says in this respect. However, perhaps before long, Dr. Travers will hear of something in connection with gas-fires which will give radiant heat without any ill-effect even on "that schoolgirl complexion;" and without any reduction of heating efficiency. With regard to coke-heated water boilers, we strongly recommend him to the sympathy of his local gas company, who should be in the position to show him modern coke-heated boilers which do not possess the disadvantages of which he speaks.

The weaknesses alleged by Dr. Travers are reduced to fancies when examined by those who have large experience of the facts, and who know of the progress that has been achieved—particularly in modern gas appliances. Our friend is much more at home when dealing with manufacturing problems of which he has made critical study.

"A.G.A." New Laboratory for Appliance Testing.

On various occasions reference has been made in the "Journal" to the excellent work which is accomplished by the testing laboratory of the American Gas Association. From all quarters of the gas industry in America, there comes information which certifies its value—not only to gas supply, but to the manufacturers of gas appliances, and the users of them in home and factory. The work of the laboratory has expanded to such an extent that the Association feel the time has come when they cannot afford to allow such beneficial operations to be retarded by the limits of present accommodation. Experience has also shown that, with more space, more efficient methods can be provided for the realization of the desired end. In view of this, a Special Committee (appointed in June last) have submitted a report to the Executive Board of the Association, in which they propose plans for a new and larger building for the laboratory at Cleveland, Ohio. The site, which is near the present laboratory, is at present owned by the East Ohio Gas Company, who have given the laboratory splendid assistance during the past two years. The plans for the new building show that it will contain approximately 21,000 sq. ft. of floor space; and the estimated expenditure, including the removal of the existing equipment to the new building, will be approximately $145,000. The present laboratory has only for office storage and testing purposes approximately 12,000 sq. ft. of floor space. In support of the indictment of the present laboratory in respect of insufficiency, the report states that in it the staff are now testing four major types of domestic appliances, conducting research work on mixed gases, and completing other investigations necessary in the preparation of new requirements and the revision of old ones. These activities tax the existing facilities to the limit; and several divisions—notably the hot water and central house heating sections—are hampered by lack of space. It is probable that before long a special department will be started for manufacturers to use as an experimental station quite apart from the official and independent test work of the laboratory staff, which, of course, is the main thing. This information is evidence that the gas industry of the United States is of opinion that their expenditure on an official testing station for gas appliances has been a good investment, and can with profit be increased.

Tar Distillation.

The members of the North of England Gas Managers' Association, last Friday week, visited the St. Anthonys Bye-Product Works of the Newcastle Gas Company, and saw in operation some of the processes which were referred to in a highly interesting paper submitted by Mr. S. A. Wikner, F.I.C., at the meeting held earlier in the day. It described experiences in continuous tar distillation and in certain refining processes. Three sets of Hird continuous stills are in use, and, as Mr. Wikner mentions, this type of plant, fired by gas, has been in successful operation in works with clean tars of uniform quality. However, under the conditions existing at Newcastle, several difficulties were at first experienced, the character of which is described in the paper; but it is shown that these were not insurmountable. The principal trouble appears to have been with violent frothing in the preheater, whenever the crude tar contained more than 5 p.ct. of water. This led to the introduction of a method of dehydration by steam, which has had a notable effect upon the working of the plant. As a matter of fact, its performance has been doubled. Prior to dehydration by steam, the average capacity was barely 30 tons; but afterwards it was increased to 60 tons a day, with this gratifying monetary result: The operating and repairing costs were halved, representing a saving of about 2s. per ton of tar, or about £2000 a year. Mr. James McLeod, of the Glasgow Corporation Chemical Department, confirms the improvement from their practice. A recently installed steam dehydrator of a capacity of 100 tons per day has, he says, had the effect of at least doubling the throughput of tar stills of the 20-ton size, with preheater of the usual

type. Other improvements in the tar plant at Newcastle are referred to in the paper, which also includes a description of working methods evolved, after much experiment, in relation to causticizing, carbonating, and other matters. Towards the end of the contribution, brief notice is made of road tars, for which purpose about 75 p.ct. of the crude tar is worked up. The practice is to distil nearly to pitch, and to thin back with selected oils from which tar acids and naphthalene have been removed. Tar to any viscosity or distillation test can be produced at will. Provision is also made for the admixture of bitumen or asphalt. Mr. Wikner, it will be seen from the complete paper, describes a method whereby mixtures containing up to 20 p.ct. of Trinidad asphalt can be made without fire heat. He acknowledges that the process is rather slow, but it is practicable; and by it there is escape from the troublesome use of fire-heated pans, which require frequent cleaning, and the bottoms of which burn out very quickly. The paper is full of interesting information, presented in very concise form.

Wrought-Iron Tubes.

On this subject an important letter from Mr. Walter T. Dunn appears in our "Correspondence" columns. It shows that representations have been made to the Wrought-Iron Tubing Committee of the Institution of Gas Engineers as to the desirability of attention being called to the necessity, when ordering or purchasing tubes and fittings, of specifying that they must be produced in conformity with the regulations contained in the specification of the Institution. The letter supplies reasons why this should be done, and gives a list of makers who, we understand, are prepared to comply with the specification.

The "Gas Salesman."

In the "Gas Salesman" Supplement this week will be found reports of the meetings of the London Area, Northern, and Southern "B" Circles. Another interesting instalment of "An Elementary Treatise on Gas Lighting" is given; and there is a contributed article on "Fuel-less Cookery." Items also appear regarding the activities of our American friends.

Public Lighting Enterprise.

In our "Miscellaneous News" columns to-day, there is a reference to the public lighting of Morpeth. It shows how the enterprise of the Gas Company in installing "Littleton" mantle cluster lamps at certain of the principal points in the town, at their own expense, has produced much gratification and good testimony. This is a way of retaining the public lighting of a town.

Smoke Prevention.

It will be seen from an announcement in later columns that the Royal Sanitary Institute are making special efforts to provide instruction in matters affecting the abatement of smoke. A series of lectures will commence on Nov. 4, and, although primarily intended for smoke inspectors, they will be open to others interested. The gas industry are especially concerned. The lectures, it will be seen, are to be delivered by men whose names are well known in the gas industry. A number of inspections and demonstrations has also been arranged. Among them there will be a visit to the L.C.C. County Hall, Westminster Bridge, and to the Metropolitan Asylums Board Hospital, at both of which places there are coke-fired plants.

Spreading the Light.

An esteemed correspondent, with the remark, "it may be of interest to you," sends us the following extract from the "Dublin Letter" in the "Cork Examiner" for Oct. 19: "An association was formed here to-day which proposes to launch a campaign in favour of the more extensive use of electricity in the city. Citizens of public spirit are expected to co-operate with those directly interested in the Shannon scheme in telling the country of the almost illimitable resources to be made available presently, and of the manner in which they may be most advantageously utilized. The campaign will not depress the shareholders in the Dublin gas concern, which, despite competition, waxes prosperous, and should be well able to stand the shock of increased rivalry. The date of the onset of Shannon power and light is uncertain; but notices widely displayed warn the public of the danger of tampering with the transmission masts. These masts, or towers, are of the plainest character, and should blend nicely with a landscape already decorated with railway track, telephone, and telegraph wires. In Great Britain the new Electricity Board is taking steps to have towers of graceful design and pleasant hue; but the British are a foolishly sentimental race." We are more than interested; we are amused.

The Factories Bill.

A short while ago, the Association of British Chambers of Commerce sent a communication to the Home Secretary regarding the Factories Bill. The attitude of the Association is that, while in favour of the consolidation of the Factory Acts, British commerce and industry should not at the present time be called upon to support additional burdens calculated to increase the cost of production. They are therefore opposed to the various extensions foreshadowed in the proposed new Bill. The Home Secretary has replied that the Government are satisfied that the time has come for an amending Bill. There are many matters relating to the welfare and well-being of the workers which need consideration; and while he is anxious to hear, and if possible to meet, the views of employers on matters of detail, he is not prepared to withdraw the measure. In this answer the Home Secretary entirely overlooks the main point of the objection of the Association, which is that industry to-day is unable to withstand any further burden, until the general deadweight of national and local taxation is reduced within reasonable limits. It is obvious that any legislation which adds to the burden on industry must adversely affect the welfare and well-being of the workers.

Nationalization and Other Matters.

At their recent conference at Blackpool, the Labour Party formulated a new programme, in order that the country may know what it is up against. It is composed of a wonderful mass of items, many of which do not directly concern the gas industry. Among them, however, we see that the well-worn subject of the nationalization of mines is again to the front. Also in connection with the mining industry, the repeal of the 8-hour day is to be effected; provision is to be made for superannuation at 60 years age; the school-leaving age in the mining districts is to be raised to 15 or 16, with the provision of the necessary maintenance allowances, and preparatory training for other forms of employment; there is to be a suspension of recruitment of adult labour from outside the industry; the transfer of unemployed miners under proper arrangements is to be made to areas where there is a demand for workers; adequate provision is to be secured on national lines without recourse to the Poor Law and local rates for the maintenance of those miners for whom work is not available; there is to be compulsory grouping and amalgamation of mines, so as to secure the advantages of unification; the establishment of a selling agency is to be effected in each coalfield, either by the State or by public utility societies; and legislation is to be passed to enable local authorities to undertake the sale of coal. The Labour Party are lavish with their sop to mining labour, which there is a strong desire to consolidate once more, after the shattering blow administered to it last year. Too much space would be required to catalogue all the other requirements set forth in the programme. It may, however, interest some readers to know that peeping from the mass is a suggestion for graduated surtax on unearned incomes from £500, which is estimated to raise annually 85 millions sterling towards paying the cost of the various proposals. That is kind of the Labour Party. They have a strong bias to one-class legislation.

At a conference of local authorities, held at Newcastle on the 18th inst., it was decided to form a Regional Committee to deal with the problem of atmospheric pollution on Tyneside. A temporary Committee has been appointed, composed of one representative from each local authority. Dr. Kerr, Medical Officer of Health for Newcastle, has been appointed Hon. Secretary for the time being.

PERSONAL.

Mr. JOHN W. MCLUSKY, Glasgow City Gas Engineer, has been elected a member of the Society of Chemical Industry.

At a meeting of the Directors of the St. Austell Gas Company, Mr. S. J. INGRAM was unanimously appointed Chairman in succession to Mr. W. M. COODE, who has resigned.

Mr. J. TAYLOR, Gas Manager at Ballymena (co. Antrim), has resigned owing to ill-health, after 24 years' service. He has been granted a superannuation allowance of £150 per annum.

It was announced to the members last Friday evening that at a Council meeting which preceded the ordinary meeting, Sir ROBERT A. HADFIELD, Bart., had been elected an honorary life member of the Institution of Mechanical Engineers. The President (Sir Henry Fowler, K.B.E., LL.D.) announced that Sir Robert was elected a member of the Institution 39 years ago. He had been a member of the Council since 1908, and was now a Vice-President. He knew that he was voicing the feelings of the whole of the members of the Institution in saying that, in honouring Sir Robert Hadfield, they were honouring themselves.

Mr. and Mrs. W. A. SURRIDGE attained their golden wedding on Oct. 18; and to celebrate the occasion the present partners in Messrs. E. Foster & Co. (of which Mr. W. A. Surridge was for very many years a member) gave a private luncheon at the Langham Hotel, which was attended only by the partners, their wives, and certain relations of Mr. and Mrs. Surridge. Mr. R. W. Foster made an appropriate speech, and afterwards, on behalf of himself and his partners, presented Mr. and Mrs. Surridge with a golden salver, a replica of George II. period, *circa* 1730, suitably inscribed, and signed by all the partners. Among those who are now members of the firm are Mr. Surridge's son-in-law, Mr. E. E. Gabriel, and his nephew, Mr. Rae P. Normand.

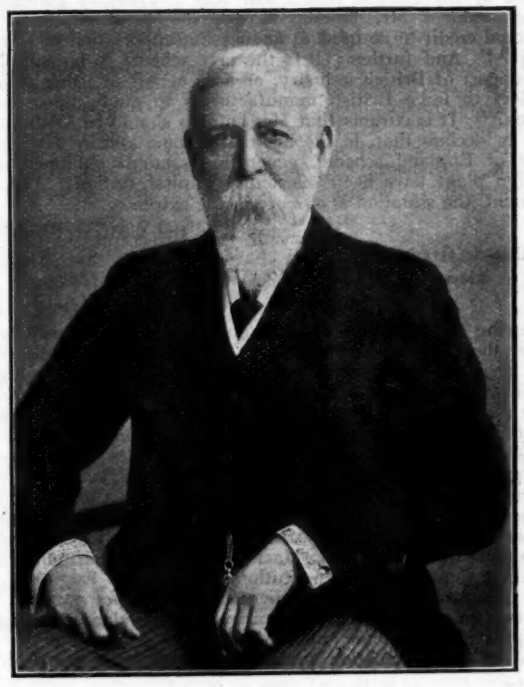
OBITUARY.

ALEXANDER DICKSON.

Mr. Alexander Dickson, of "Sunfield," Westmorland Road, Bromley, whose death, in his 87th year, it was our sad duty to announce in last week's issue of the "JOURNAL," was well known in connection with the gas supply of the district in which he lived and was so greatly respected. Previous to this, however, he had been for thirty years Secretary of the old Kent Water-Works Company.

His interest in gas began with the Bromley Gas Consumers' Company—the first concern to supply gas in the neighbourhood. He quickly began to play a leading part in the affairs of the Company, and became Chairman in 1895. He conducted important negotiations connected with the amalgamation of the Crays Gas Company and the Bromley Company in 1908; and at the first half-yearly meeting of the combined undertaking acknowledgment was made of what the shareholders owed to the talent, industry, skill, and knowledge of the Chairman. The absorption of the Bromley and Crays Gas Company by the South Suburban Gas Company in August, 1912, was of even greater importance than the former amalgamation; and Mr. Dickson again played a very important part in bringing the negotiations to fruition. It was a tribute to Mr. Dickson's ability that, when the latter amalgamation took place, he was the only Director of the Bromley Company to be made a Director of the South Suburban Gas Company. He continued to be a member of the Directorate of the larger Company until shortly before his death.

Many years ago Mr. Dickson was Mayor of Deptford. At one time he lived at St. John's. Later he moved to Eastbourne, and then after the war returned to Bromley. He was formerly a member of the Bromley County Club. He leaves a widow,



The late Alexander Dickson.

one son (Mr. Alexander Dickson, Jun., who is Secretary of the Bombay Gas Company), and a daughter, to whom sincere sympathy is extended in their bereavement.

The funeral service in St. Mark's Church, Bromley, was largely attended; and there were many beautiful floral tributes.

We are sorry to learn of the death, on Monday, Oct. 17, after a short acute illness, of Ben (aged 16 years), the only son of Mr. B. GODDARD, Engineer and Manager to the Glossop Gas Company. The funeral was at Glossop Cemetery, on Oct. 20; the boys of the Sixth Science Form of the Glossop Grammar School acting as bearers.

We regret to announce the death, on Sept. 29, of M. JEAN-ROMAIN DUPOY, Deputy Chairman of the Sté. Industrielle des Compteurs, the well-known meter firm of Levallois-Perret (Seine).

ELECTRICITY SUPPLY MEMORANDA.

Mr. Beauchamp Goes to Wales.

THE Director and Secretary of the Electrical Development Association, Mr. J. W. Beauchamp, has accepted the position of General Manager of the South Wales Power Company, as from Jan. 1 next. The vacancy is due to the retirement of Mr. W. A. Chamen. As Director of the Electrical Development Association, Mr. Beauchamp has been all that could be desired by those who engaged in co-operative propaganda for the rival industry. He has always been courteous, and there has been on his part very few (if any) acts which could arouse real resentment. Those of the gas industry who have been brought into contact with him have held him in high regard. The experience which Mr. Beauchamp has gained in the propaganda work of the electrical industry will no doubt be missed in the daily operations of the organization; but perhaps his experience can now be better dispensed with, seeing that the electricity industry has, in addition to "E.D.A.," enrolled among its advertising agents the Government, the Central Electricity Board, the Electricity Commissioners, the Electrical Lamp Manufacturers' Association, the Local Circles, the Electrical Association for Women, &c. These together make a very good bunch. However, Mr. Beauchamp is only returning to the work which first engaged his attention in the electricity industry. Before becoming chief of "E.D.A.," he occupied engineering positions at Sheffield, Tunbridge Wells, and West Ham, so that he will carry to South Wales proved engineering ability, and extensive knowledge of the propaganda work of the industry.

Plant Makers and the Scheme.

When the Government scheme for the centralization of electricity generation, with its bountiful promise of expenditure on new plant and transmission lines, first saw the light of day, the manufacturers of electrical plant in this country hailed it with unfeigned delight. Then there were cheery faces; now they are clouded. Mr. D. N. Dunlop, Director of the British Electrical and Allied Manufacturers, has been criticizing the Central Electricity Board for allowing foreign tenders to be submitted for the plant required in the Scottish Electricity Scheme, which was the first to be tabled. In his statement, he says that the intention of the consulting engineers in allowing alien tenders may be, of course, to ensure some basis of comparison for assessing British prices; or, on the other hand, there may be a definite policy at work of declaring open market conditions. If the latter, then the British manufacturers view with concern the encouragement in principle of foreign electrical imports into Britain in connection with a purely national scheme. There is much which could be said on both sides. Mr. Dunlop definitely

states that the national power scheme was initiated primarily to assist British industry—not merely through the realization of cheap power, but through extensive orders for equipment for the supply and distribution of power. We can sympathize greatly with the British manufacturers, inasmuch as the costs with which they are faced—through heavy rates and taxes, and high wages for labour in relation to work done, and other expenditure—place them at a grave disadvantage in relation to their Continental competitors. Moreover, the capital to be raised by the Central Board will bear a Treasury guarantee, which induces Mr. Dunlop to ask the question: "Is the national credit to be used to finance the importation of foreign plant?" And further: "Is the new scheme to be conceived as support of British industry, or as a means of using foreign tenders to force British manufacturers to quote uneconomic prices?" It is curious that Mr. Dunlop should be in the position to declare that, in the Scottish scheme and in the South-East of England scheme, generating stations equipped with foreign plant have been selected as capital stations. At the moment, the situation is obscure in the extreme.

Electric Overhead Lines.

We learn that the Central Electricity Board have appointed Sir Reginald Blomfield, R.A., to advise them on questions regarding the design and colouring of the towers for carrying electric transmission lines under the Government scheme. The revolt of local authorities and residents in the most picturesque parts of our country against these towers and overhead lines is growing in intensity. Due to this we imagine is the desire of the Central Electricity Board to beautify as much as possible the columns from which will be suspended the cables carrying the lines for conveying energy at 132,000 volts. Whether there will be success in producing a form of standard pole which will add to the picturesqueness of the countryside and satisfy the critics, remains to be seen. Concerning the working pressure of 132,000 volts, it is noticed that Mr. D. M. Macleod, the new Chairman of the Scottish Centre of the Institution of Electrical Engineers, in his Inaugural Address, commented on the fact that at the present time no line in this country is in regular operation at a higher pressure than 33,000 volts. Here, again, comes in the question of the position of British manufacturers. Hitherto our cable makers have been able to keep pace with the requirements of home transmission schemes; but the new departure leaves them far behind. Under the Central Scotland scheme, the transmission system will extend over a route length of 228 miles. Mr. McLeod asks whether the time has not arrived when the Electricity Commissioners might approve typical constructional plans for transmission lines up to (say) 33,000 volts? This, in his view, would save the time of undertakers in waiting for the consideration and approval of every line notified—a procedure which would only be justified if the methods of construction were novel or unfamiliar. Further to the question of supply in rural areas, it is understood that, at a meeting of interested engineers at the Institution of Civil Engineers on the 12th inst., it was decided to establish forthwith an Association "with the object of cheapening electricity throughout the country under the Electricity Supply Act." We should have thought that the Act, if capable of accomplishing its designed objects, could do so without the establishment of another outside organization.

Using Derelict Generating Stations.

Mr. E. Kilburn Scott is concerned over the utilization of the electricity generating stations which will fall into disuse under the Government generation concentration scheme. Our impression is that these stations will in some cases simply be dismantled, and such prices be obtained for the plant as it will command. The market for it cannot possibly be large. Mr. Kilburn Scott thinks that some of the plants might be utilized for providing a hot-water service to the communities in their neighbourhood. He has been interested in a company in America which, among their activities, have brought into use the boiler plant of a generating station that had become obsolete by the building of super-power stations outside the city. The old plant was near the centre of the city, and so a scheme of steam supply could be developed by the use of relatively short mains and branches. It appears that practically all the large buildings, churches, chapels, schools, shop premises, theatres, cinemas, apartment houses, hotels, and restaurants are now heated from this public steam supply. A good deal of cooking in hotels and restaurants is also accomplished by it, and so is washing and laundry work. According to the article by Mr. Kilburn Scott (which was published in "The Electrician"), this has become a profitable piece of enterprise. The demand has grown to an extent that has called for the installation of additional boiler plant; and there is every reason to expect that a further extension will be needed. Furthermore, a start has now been made in generating electricity by utilizing the drop in pressure between that at which the steam can be generated most efficiently in the boilers, and that at which it is delivered by the distribution system. This adds to the economy of the steam-heating system; the electricity being sold as a bye-product to the electricity distributing company. It is suggested by the author that something of the same kind could be done here with generating plant which is to be thrown out of commission by the super-power stations under the scheme which is being developed. It may be there are boiler plants working at a good efficiency; but there are many which are not among the number, and which will have to be dispensed with. We know that many of these steam plants only work at a thermal efficiency of between 50 and 60 p.ct.; and, with the losses of heat between the points of generation and of service, the net efficiency of the steam as a heating agent would become very low indeed. In respect of economy and efficiency, a coke-boiler *in situ* would give a prompt knock-out blow to the central station steam supply. Moreover, there are not many districts sufficiently densely populated with potential consumers to justify doing what Mr. Kilburn Scott proposes.

Puerilities.

We are becoming a little uncertain as to whether "Meteor" is always responsible for the notes which appear over his name in the "Electrical Times." Occasionally, we are tempted to think the office boy lends a hand. Perhaps the office boy will indignantly deny the belittling insinuation. We find an example of the writing which raises doubt in the notes signed "Meteor" in the issue of our contemporary for Oct. 13. The subject is co-operation between the gas and electrical industries in the matter of fuel supply. The opportunity for the remarks was a speech at the dinner of the Electric Power Engineers' Association by Mr. Archibald Page, President of the Institution of Electrical Engineers, and Chief Engineer of the Central Electricity Board. Apparently Mr. Page's view is that there would be nothing in co-operation unless it assures the production of "cheap" heat units, which, of course, is a difficult thing where electricity is concerned, with at best 18 or 19 p.ct. efficiency in fuel utilization. The comment signed by "Meteor" is as follows: "It is an ingenious device for tying us to what in the natural process of events would become a corpse in the next generation or two. Our gas undertakings are hopelessly conservative and antiquated in their methods. Commercial gas under high pressure delivered by pipe-line to big industrial consumers may have a future. Gas should not be allowed on domestic premises. If collaboration in low-temperature distillation is to take place at all, it should either be with the coal mines or with ourselves." Nobody but an ignoramus could have written such absurdity as is found in those passages. To comment specifically upon them would simply be waste of time, and an insult to intelligent men.

FORTHCOMING ENGAGEMENTS.

Oct. 28.—London and Southern District Junior Gas Association.—Meeting at the Westminster Technical Institute, 7.30. Presidential Address of Mr. Leonard Lacey.

Nov. 1.—Gas Companies' Protection Association.—Annual meeting, Caxton Hall, at 3 o'clock.

Nov. 5.—Scottish Junior Gas Association (Eastern District).—Joint meeting with the Western District at Glasgow.

Nov. 5.—Western Junior Gas Association.—Meeting. Papers by Mr. J. Malsbury, B.Sc., of Weston-super-Mare.

Nov. 8.—National Gas Council.—Meeting.

Nov. 8.—Federation of Gas Employers.—Meeting.

Nov. 9.—London and Southern District Junior Gas Association.—Visit to Watson House.

Nov. 16.—Southern Association of Gas Engineers and Managers.—General meeting at the Hotel Cecil, Strand, W.C. 2, at 2.15.

Nov. 17.—Society of British Gas Industries.—Autumn general meeting at the Hotel Cecil.

Nov. 23.—Institute of Fuel.—Annual meeting at the Institution of Electrical Engineers.

Nov. 23.—Scottish Junior Gas Association (Western District).—Visit to the Clydesdale Iron and Steel Works, Mossend, of Messrs. Stewarts & Lloyds, Ltd.

Nov. 24.—Manchester District Institution of Gas Engineers.—Quarterly meeting in Leeds.

Nov. 25.—London and Southern District Junior Gas Association.—Meeting at the Westminster Technical Institute, 7.30. Paper by Mr. T. Campbell Finlayson.

Institution of Gas Engineers.

Nov. 7.—Emergency Committee.

Nov. 7.—Finance Committee.

Nov. 7.—Council Meeting.

Nov. 15.—Public Works, Roads, and Transport Congress. Morning—Joint Session with Incorporated Municipal Electrical Association for discussion on "Street Lighting." Afternoon—Institution Session for discussion of "How the Gas Industry can Assist Smoke Abatement."

THE GAS INDUSTRY: PAST, PRESENT, AND FUTURE.

PUBLIC UTILITY SERVICES.

Inaugural Address of the Chairman of the London Section of the Society of Chemical Industry, Mr. W. J. A. Butterfield, M.A., F.I.C., delivered at a Meeting on Oct. 3.

[Reprinted, with additions, from the Transactions of the Society of Chemical Industry.]

The chief public service, or public utility, industries, apart from those carried on by departments of the State, are transport, and water, gas, and electricity supply.

Water supply is a simple adaptation of natural resources to the necessities of dwellers in communities, and dates from early historical times. Primarily a branch of hydraulic engineering, it now embraces problems of chemical treatment, but not of chemical industry proper. For domestic needs, at least, it is not subject to competition; and a reduction of consumption is often a laudable ambition, since it connotes elimination of waste. In these respects water supply stands apart.

Transport as an organized public service is a much more recent development, but in its various ramifications of railways, tramways, and omnibus is that on which there has been the largest capital outlay, and which has the largest revenue of the public utility services. It has developed from organized systems of horse vehicles, traversing certain routes at known times, and available at equal charges for equal service to any member of the public, to the present stage in which power derived from fuel or a head of water has almost entirely displaced the draught animal. It embraces problems of practically all branches of engineering, but is in no sense a chemical industry, though naturally chemical problems indirectly arise in connection with it. The application of mechanical power to propulsion on railways, tramways, and waterways is of somewhat later date than the inception of public gas supply.

Electricity supply is the smallest of the public utility services, and, being also the youngest member of the family, receives more favours than its elder brethren. Tit-bits, by way of special financial facilities are bestowed upon it, while maternal (and grandmaternal) caresses are lavished on it in season and out of season by its self-constituted sponsors in Parliament and the Press. Whether, as it attains puberty, it will be the better for these favours remains to be seen, but we all remember that a spoilt child is apt to become in later life a costly burden on the community. Electricity supply is in no sense a chemical industry.

The gas industry, as a public service, had its beginnings in 1812, on April 30 of which year the Gas Light and Coke Company received its Charter of Incorporation, which was granted under an Act passed in 1810. By the year 1815, this Company had fifteen miles of street mains, extending in one area from Norton Folgate to the west end of Cheapside, and in another area from Pall Mall and Westminster to Temple Bar. Another Company at that time had gas mains from Temple Bar to the west end of Cheapside, while other companies were being formed to supply Southwark and the east end of London.

It is thus now 115 years since the birth of gas supply as a public service, and its growth has been fairly uniform and vigorous right up to the present time, while the prospects of expansion for many years to come are extremely rosy. Members of this Society will regard the progress of the gas industry with no little satisfaction, because gas supply is the only public utility service which is fundamentally a chemical industry.

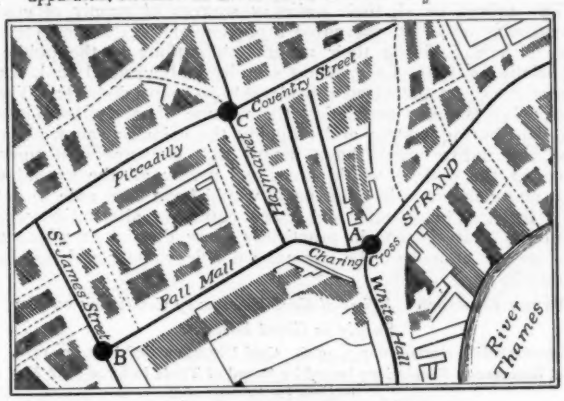
TABLE I.—*Capital, Receipts, and Profits of Statutory Public Utility Services* (1925), *Great Britain.*

—	Railways.	Gas Undertakings.	Electricity Undertakings.
Capital outstanding . .	£1,115,700,000	£138,561,659	£194,019,658
Receipts	£119,600,000	£66,042,643	£40,914,276
Profits (gross)	£34,600,000	£9,183,995	£18,428,865
Ratio of receipts to capital, p.ct.	10·72	47 66	21·09
Ratio of profits to capital, p.ct.	3·10	6·63	9·50

In the magnitude of the services it renders to the public, it is second only to the railway organization. From Table I. it will be seen that the revenue of the gas undertakings of Great Britain is about half as much as the revenue of the railways, and half as much again as that of the electricity undertakings. The profit shows a moderate return of 6·63 p.ct. on the outstanding capital in the gas industry, whereas at the present time the corresponding figures are only 3·10 p.ct. for the railways and as much as 9·50 p.ct. for electricity undertakings. It would therefore seem that, of these three great public utility services, the gas industry makes less call on the capital resources of the country, relatively to the service it renders, than either railways or electricity supply. The figures given cover gas and electricity undertakings having statutory powers, including those owned by local authorities. Four-elevenths of the gas sold in Great Britain is supplied by such authorities, whereas about seven-elevenths of the electricity supplied is generated at works belonging to local authorities. It would be outside the scope of this address to attempt to trace any connection between these varying degrees of public ownership and the profits shown in the table.

EARLY YEARS OF GAS SUPPLY.

The early years of public gas supply were eventful in many respects; and having regard to the novelty of the work, and the prejudices it aroused—not least among scientific men—it is really surprising that progress was so rapid. From the outset, the managers of gas-works appear to have determined that there should be no interruption, through accident or otherwise, of the supply, and a map (see fig. 1) of the street mains in



* *The gasometer at this place is equal in capacity to 22,000 cubic feet.*

† *The capacity of the gasometer here is equal to 15,928 cubic feet.*

‡ *At this station the gasometer is equal in capacity to 14,608 cubic feet.*

Fig. 1.—Map of Street Mains in 1815.

the vicinity of Charing Cross, given in Accum's "Treatise on Gas-Light," published in 1815, shows that they were interconnected in such a manner that one works might take up any temporary curtailment or failure of supply from another works, and that even a fractured main would not cause more than purely local interruption of supply.

GAS—THE ONE PUBLIC SERVICE WHICH NEVER FAILS.

The tradition, shown to have been well established within three years of the inception of public gas supply, that the service must be maintained at all costs, has ever since been rigorously observed by the gas industry. No other public utility service has a record which stands comparison in that respect with it.

Water supply, even at the present day, is subject in many areas to limitation to a few hours a day in seasons of prolonged drought. Railway services are curtailed or fail completely locally, and occasionally generally, through their own staff, or the coal miners, ceasing work; omnibus services fail on similar grounds; tramways and underground railways stop for the same reason, and in addition all too frequently because of breakdowns in the electricity generating and distributing plant. Public electricity supplies are cut-off at times by reason of withdrawal of labour, and frequently fail for longer or shorter periods either over an extensive area, or quite locally, through short-circuits or "blowing" of fuses.

GAS SUPPLY DURING THE TURMOIL OF 1926.

An intimate acquaintance with conditions in the gas industry for more than 35 years past warrants the statement that, in that period at least, there has been no serious interruption of gas supply in any place worthy of its name in Great Britain. The culmination of the industry's career in this respect was reached during the period of the general strike and coal stoppage last year, when every other public utility service (water supply perhaps excepted) failed for longer or shorter periods in important areas, if not everywhere. It will always redound to the credit of the gas industry that it alone of the great public utility services was prepared to face all the contingencies of those trying and eventful months.

For some years past, most gas undertakings had kept in hand, throughout the year, stocks of coal and oil sufficient for

at least two months' requirements—often considerably more. During last year's stoppage of normal supplies, these sufficed until foreign coal and more oil could be purchased and delivery obtained. But even more than for preparedness in the matter of its raw materials is the gas industry to be commended for the harmony and loyalty which it had inspired in all ranks and grades of its staffs, as a consequence of which for some days practically the only industrial premises in many districts in which managers and men pursued their daily tasks in a normal manner were the gas-works.

For this devotion to duty on the part of the rank and file of the gasworkers, acknowledgment is due in large measure to the wide adoption by gas undertakings of co-partnership schemes. The institution of co-partnership by Sir George Livesey in the South Metropolitan Gas Company took place some 37 years ago. One of the Past-Presidents of this Society, Dr. Charles Carpenter, M.B.E., assisted at its birth, and he has since been indefatigable in commending it to other gas undertakings, a large number of which have adopted it. Comparatively few other industrial concerns, however, had adopted it prior to May 3, 1926, and the rest then found themselves faced with labour troubles from which the gas industry remained practically immune.

The failure of all their ordinary sources of supply of coal eventually, however, prevented a portion of the gas undertakings strictly fulfilling their normal obligations to the public, especially as, with the growing scarcity of household coal, the demand for gas increased considerably in many districts. The choice lay between restricting the volume of gas passed into the distributing system and reducing the calorific value. The first alternative would have meant that consumers in some parts of the district would have had nearly all the available gas, and consumers in other parts would have been able to get very little. The second and more equitable alternative was naturally that chosen, in practically every district in which a full supply of gas of the normal calorific value could not be maintained.

Table II.—1926. *Effect of Coal Emergency Conditions on Gas Supply in Great Britain.*

General Strike started May 3, 1926. Coal Dispute ended Nov. 30, 1926.
Coal Emergency Regulations issued by Board of Trade in force from May 1 to Dec. 19, 1926.

Proportion of gas sold on which testings under Gas Regulation Act should have been made in 1926 (4th quarter)	80·3 p.ct.
Proportion of gas sold on which testings under Gas Regulation Act were made in 1926 (4th quarter)	71·5 ,,

Proportion of gas tested in which—
(1) The declared calorific value was fully maintained.
(2) The deficiency was *nil*, or less than 5 p.ct.

1926.	Declared Calorific Value Fully Maintained.	Deficiency *Nil*, or Less than 5 P.Ct.
	P.Ct.	P.Ct.
First quarter	99·99	*Nil*
Second quarter	73·54	99·14
Third quarter	71·17	89·93
Fourth quarter	77·58	92·44

It must not be supposed, however, that there were widespread or serious deviations from the normal course of gas supply. Table II. shows succinctly the manner in which, to use a Biblical metaphor, the gas indutry succeeded in making bricks—and good bricks too—without straw, when those who should have provided it with its counterpart of the latter lamentably failed it.

It will be seen from the table that only about 80·3 p.ct. of the gas sold in Great Britain was liable at that time to be tested under the provisions of the Gas Regulation Act; and as regards 8·8 out of this 80·3 p.ct. the local authorities and consumers affected had failed to take the necessary steps to ascertain the calorific value of the gas delivered. But there is definite information from the independent official gas examiners as to the calorific value of about 71·5 p.ct. of the gas supplied by authorized gas undertakers in Great Britain throughout the general strike and coal stoppage of 1926. It will be seen that, as regards over 70 p.ct. of the gas which was thus tested, the declared calorific value was maintained unimpaired throughout that time. As regards another 20 p.ct., the average deficiency in calorific value in any quarter was less than 5 p.ct. Thus we see that, as regards those gas undertakings whose supplies were officially tested—representing 71·5 p.ct. of the gas sold in Great Britain—only 10 p.ct. of the gas which they sold in any quarter of that troublous year was more than 5 p.ct. lower in average calorific value than it would have been in normal times.

It must be a matter of congratulation to members of this Society that the one public utility service which is fundamentally a chemical industry comported itself so well as these figures indicate throughout the industrial turmoil of 1926. It is difficult to envisage the hardship and misery which would have ensued in our larger towns, especially to the weaker members of the community, had the gas supply failed even for a day.

Present Conditions of Gas Supply.

Having glanced at the past, and having indicated also the superior standing of gas supply among the public services in the matter of trustworthiness in all circumstances, it will be convenient now to refer to the present condition of the gas industry.

Next to continuity of supply, the present aim of gas undertakings is to deliver gas which does not vary greatly, from day to day and from hour to hour, in its calorific value. This aim has received legislative authority through the provisions of the Gas Regulation Act, which came into force on Jan. 1, 1921. A gas undertaking is, however, brought under its provisions only when an Order therefor is made by the Board of Trade.

The testing provisions of the Act became applicable to more than 100 gas undertakings during the latter part of 1922. It is instructive to observe from that year onward the extent to which the undertakings whose supply has been tested in accordance with the prescriptions of the Gas Referees, who are appointed under the Act, have fulfilled the obligations to supply gas of which the average calorific value in any quarter, ascertained from those testings, is not less than the declared value of the undertakers. In any quarter in which the ascertained average calorific value is less than the value which the undertakers have declared they will supply, which value is the basis of charge by the therm, the Chief Gas Examiner determines the amount by which the revenue of the undertakers has consequently been improperly increased. Such amount has to be applied to a reduction in the price of gas in a subsequent quarter. In practice, the Chief Gas Examiner determines the improper increase in revenue as a proportion of the gas rental for the quarter, corresponding with the ratio of the deficiency in average calorific value to the declared calorific value. The ultimate effect of his determination is, therefore, that consumers as a whole pay on the basis only of therms actually received in any quarter in which the average calorific value has been ascertained to be less than the declared value. The adjustment is necessarily deferred to a subsequent quarter; but the trouble of having to make it, and the opprobrium attaching thereto, are such that none of the larger gas undertakings, even might they have been so minded, have risked any infraction of their obligation in this respect. These remarks must not be taken as suggesting that moral responsibility is not the predominant force which determines the observance of obligations by the majority of the gas undertakers in this country.

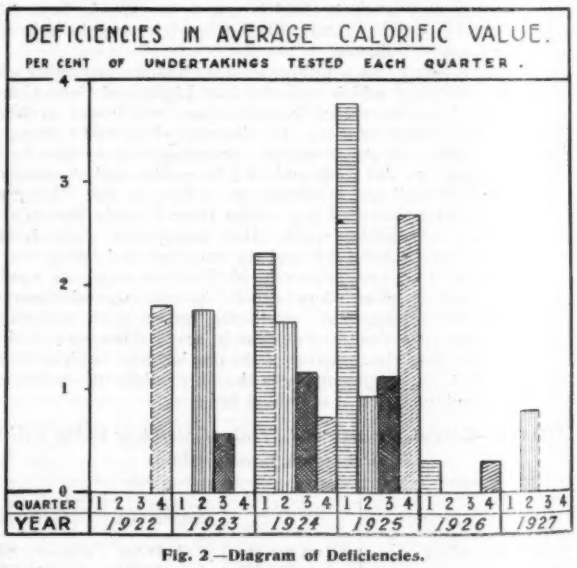

DEFICIENCIES IN AVERAGE CALORIFIC VALUE.
PER CENT OF UNDERTAKINGS TESTED EACH QUARTER.
4
3
2
1
0
QUARTER 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4
YEAR 1922 1923 1924 1925 1926 1927

Fig. 2.—Diagram of Deficiencies.

Lapses have, however, occurred in certain instances since the fourth quarter of 1922, and the proportion of such cases is shown in fig. 2, as a percentage of the number of undertakings whose gas supply was officially tested in each quarter. These numbers range from 111 undertakings in the fourth quarter of 1922, to 383 undertakings in the second quarter of 1927. The percentages of lapses in one or two quarters may appear large; but it must be emphasized that the proportion of all the gas sold which is affected by these determinations is almost negligible. In no quarter did the gas to which these determinations applied represent more than 750 c.ft. out of every million c.ft. of gas in respect of which official testings were made; and the mean deficiency in calorific value for all the cases was only 1·25 p.ct. Fig. 2 shows also that, in several quarters, no undertaking whose gas was tested had an average below its declared calorific value.

It might, therefore, be argued that any adjustment of charges is unnecessary, and not worth the trouble entailed thereby; but against this must be set the good influence the principle involved has upon the relationship between the gas undertaker and the gas consumer. The latter feels that he is protected against being charged for gas of higher quality than that which

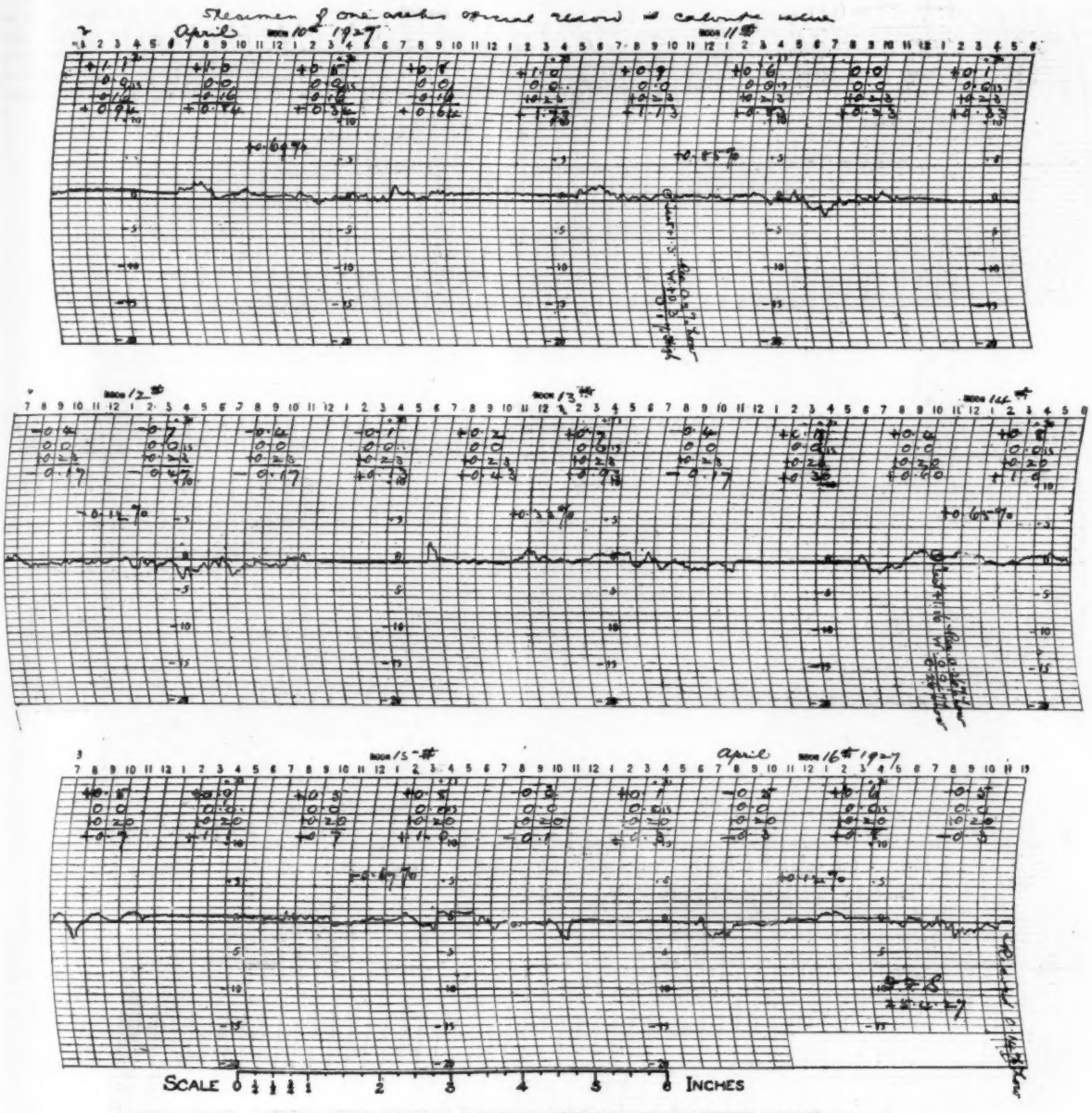


FIG. 3.—ONE WEEK'S OFFICIAL RECORD OF CALORIFIC VALUE.

he has in fact received. The principle of adjustment referred to was introduced in the Gas Regulation Act, 1920, largely, it is understood, at the suggestion of Mr. H. C. Honey, O.B.E., who became under the Act the first Director of Gas Administration at the Board of Trade.

THE THERM SYSTEM OF CHARGING.

The system of charging for gas supplied by the therm in place of by simple volume, was introduced through the Gas Regulation Act; and for its adoption and retention three Past-Presidents of this Society have been largely responsible. Dr. Charles Carpenter, M.B.E., impressed its value upon the Fuel Research Board, who, in 1919, under the chairmanship of Sir George Beilby, F.R.S., recommended its adoption. In 1923, a Departmental Committee, of which Mr. W. J. U. Woolcock, C.B.E., was a member, reported: "We are unanimously of the opinion that the method of charging for gas on the basis of its heating properties—*i.e.*, by the therm—is the best safeguard of the consumer." Having regard to the fact that, under the therm system, the consumer does not pay for whatever incombustible constituents there may be in the gas, it is not surprising that one of the aims in a modern gas-works is to keep the proportion of such components as low as is consistent with a high degree of uniformity in calorific value and density.

It is hardly necessary to explain the therm system at the present time; but it may perhaps be said briefly that a therm is 100,000 British thermal units, and the number of therms consumed is ascertained by multiplying the number of cubic feet of gas, as registered by the consumer's meter, by the number of British thermal units which the gas undertaking has declared that 1 c.ft. of the gas supplied by it will contain, and dividing the figure so found by 100,000. For example, if the declared calorific value is 600 B.Th.U. per c.ft., 1000 c.ft. of the gas afford 6 therms; whereas if the declared value is 200 B.Th.U. per c.ft., 1000 c.ft. afford only 2 therms. These figures of 600 and 200 do, in fact, represent the extreme limits of calorific values declared by any undertakings in Great Britain; but probably 90 p.ct. of the gas supplied in this country falls between 440 and 560 B.Th.U. per c.ft.

Gas undertakings have been given freedom of choice in order that they may adopt such a calorific value as is obtainable economically from the coal and oil locally available, and is adapted to the special needs of the district. The only direction in which the freedom of choice given to undertakers as to the calorific value of the gas they supply can become detrimental to the interests of the consumer is that apparatus is not, without re-adjustment, transferable from one district to another in which the calorific value differs therefrom by as much as 50 B.Th.U. per c.ft. This particularly affects bodies such as the railway companies, which have premises in many different districts, and desire, as far as possible, to use similar standard gas appliances throughout.

Therms in the gas accounts rendered to consumers are based on the declared calorific value of the gas. Since the average calorific value for any quarter, as ascertained from the official testings, must not be less than the declared value, the gas supplied to the consumer in practice is of somewhat higher average value than the declared value.

UNIFORMITY IN CALORIFIC VALUE.

There is the further requirement in the Act that the gas shall not for any period of two hours remain as much as a full 6 p.ct. below the declared value. This requirement tends to promote uniformity in the calorific value of the gas received by the consumer. This uniformity is, in general, more marked in the supplies given by large than by small undertakings; but

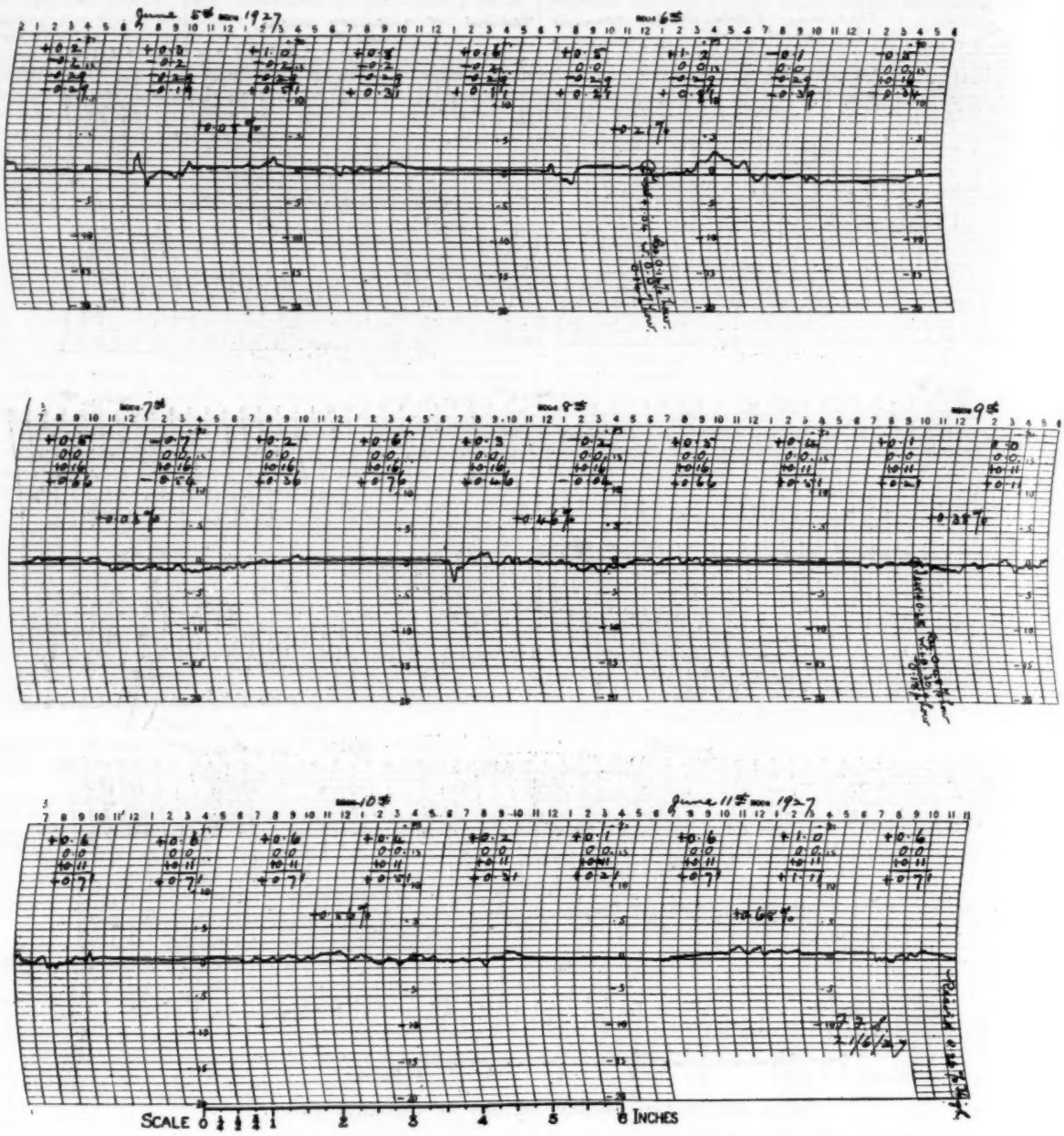


FIG. 4.—ANOTHER SPECIMEN OF THE WEEKLY OFFICIAL RECORD.

some of the latter achieve practically as good results as the former.

By way of indicating the uniformity of calorific value of the supply given through two trunk mains, each of not less than 30 in. diameter, reproductions are given for one week in each case (figs. 3 and 4) of the record sheets of recording calorimeters in use in official testings of the gas supplied by the undertakers in question. The length of record sheet is 6 in. for a period of 24 hours, and the fluctuations of calorific value are shown on a scale of half-an-inch for 5 p.ct. It will be seen from figs. 3 and 4 that the gas very rarely deviates as much as 3 p.ct. from the average calorific value. The figures written on the sheets have been put in by the County Gas Examiner at the end of the week, and illustrate the manner in which he deduces, or integrates, from the line, after certain corrections have, if needed, been made for deviation from the results of control testings, the mean calorific value for each period of six hours, and thence for the day and for the week.

TABLE III.—*Extent of Variation in Calorific Value of Gas Supplied by Six Large Undertakings in the First Quarter of* 1926.

[From results of two testings each day at one of the testing places for each undertaking.]

Declared Value = 100.

Undertakers . . .	A.	B.	C.	D.	E.	F.
Average ascertained	100·62	101·70	100·18	100·24	100·80	100·65
Highest result . .	102·20	103·20	102·44	103·30	105·05	106·25
Lowest result . .	98·23	99·00	96·86	97·10	97·58	97·13
Extreme difference.	3·97	4·20	5·58	6·20	7·47	9·12

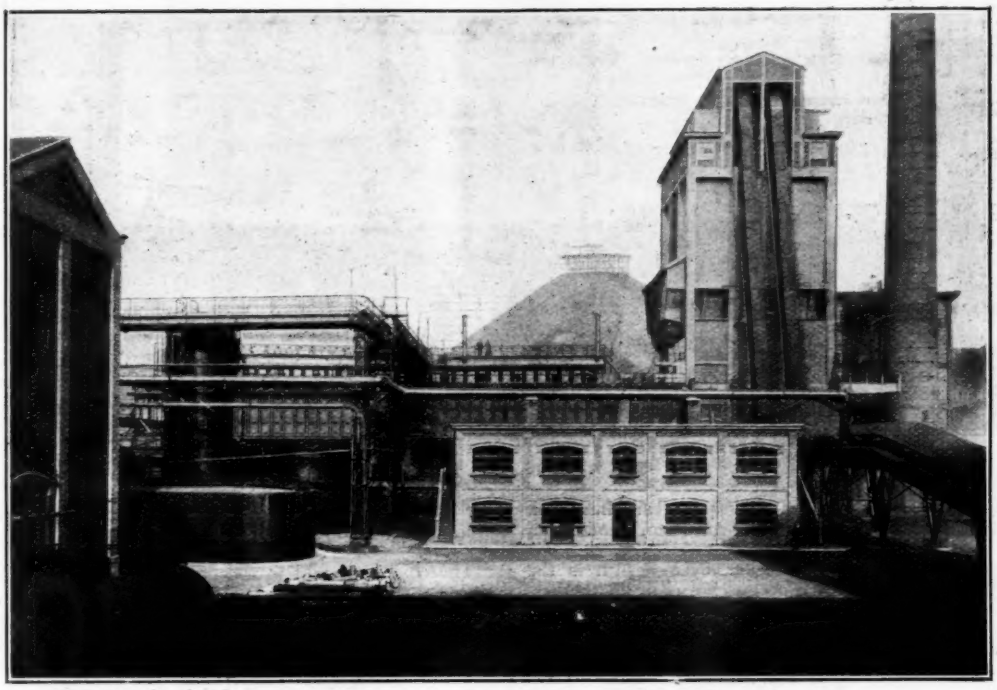
These record sheets each cover only one week, but may be taken as typical in each case of the records for the supplies to which they refer. In many other instances, two testings are made each day with a non-recording calorimeter, and Table III. shows for six testing places, each on one of the trunk distributing mains of a different undertaking, the range of variation of the results of the testings for a complete quarter. The first quarter of 1926 has been chosen as the last winter quarter in which the coal carbonized was wholly from normal sources of supply. It will be seen that the percentage deviations from the average are not great, though obviously some of the supplies happened in that quarter to be much better than others in this respect.

All these figures refer to large undertakings, each selling over 3000 million c.ft. of gas per annum, and most of them accustomed to control, to some extent at least, by testings of calorific value made by independent gas examiners, for some years before the Gas Regulation Act came into force. Many undertakings, especially those of medium and small size, had not previously had the calorific value of the gas they supplied controlled by independent testings; and it was by reason of the novelty to them of such control that some failed to take the necessary steps to meet without fail the requirements of the testing provisions of the Act. The lapses revealed by the diagram already given (fig. 2) no doubt were largely brought about through ignorance of the undertakers as to the actual calorific value of the gas they were supplying, and the declaration by them of a higher calorific value than they could in fact maintain. Also, their gas was subject to relatively large fluctuations in calorific value. The diagram already given, and the detailed

records of official testings since 1922, indicate that many small undertakings whose gas varied greatly in calorific value a few years ago are now supplying gas which is much more uniform in value, and is therefore adapted to give a greatly improved service and better satisfaction to the consumer. In this respect, the application of the testing provisions of the Gas Regulation Act to comparatively small gas undertakings appears to have been justified by the improvement which has ensued in the uniformity of the gas they supply.

(To be concluded.)

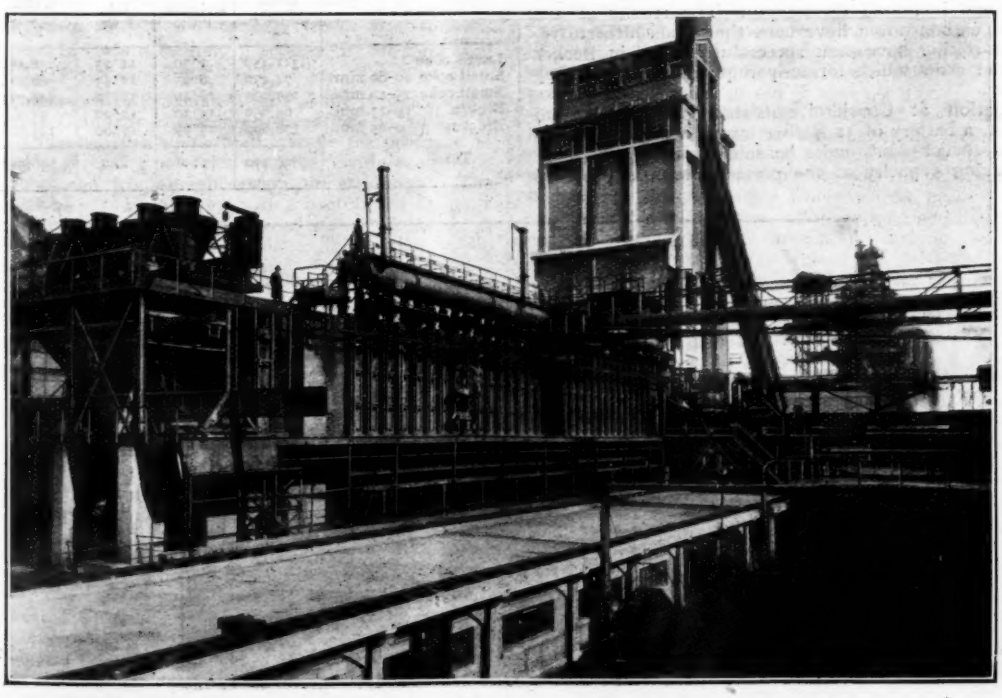
THE BECKER COKE OVEN.



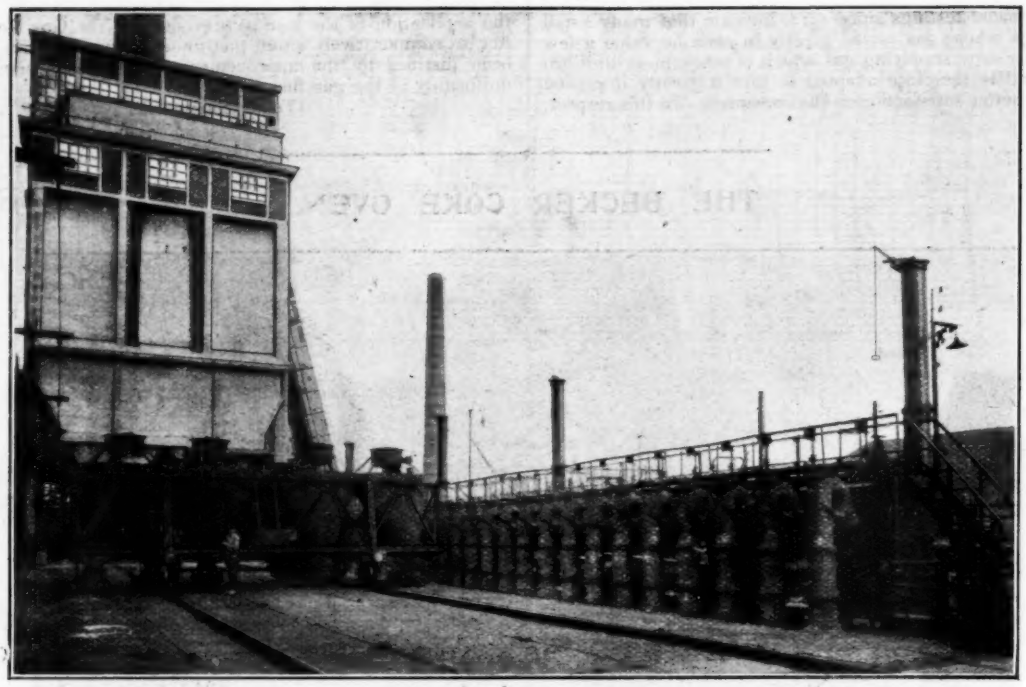
A GENERAL VIEW AT CHATELINEAU, SHOWING COAL HANDLING PLANT, OVEN BIN, AND OFFICES.

During their Continental tour, the Coke Oven Managers' Association, on Sept. 8, visited the Becker Coke Oven Plant at the Usines de Chatelineau, Charleroi, Belgium. The plant there was built by the Société de Carbonisation et de Distillation des Combustibles, Paris, for the Usines Métallurgiques de Chatelineau, for the main purposes of furnishing coke to that Company's own blast furnaces and for providing coke oven gas for use in their steel works. The plant was put into operation on May 1 this year.

Since 1921, when the first five Becker ovens were built at Chicago as a demonstration plant, 2646 ovens, with a yearly carbonizing capacity of 20,270,000 tons of coal, have been installed in the United States and Canada. During the last three years, twelve Becker oven batteries, with a total of 469 ovens, and a yearly carbonizing capacity of 4,530,000 tons, have been contracted for by the Société de Carbonisation et de Distillation des Combustibles (" Disticoke ") on the Continent of Europe; and one contract for 25 Becker ovens, with



VIEW OF PUSHER SIDE OF BATTERY, SHOWING OVEN MACHINERY AND RAM CHARGING STATION.



THE TOP OF THE BATTERY.

a carbonizing capacity of 180,000 tons per year, has been awarded to the Woodall-Duckham Vertical Retort and Oven Construction Company (1920), Ltd.

The distinctive feature of the Becker oven design is the "cross-over" flue. At a given time gas burns in all the vertical flues of a heating wall. The combustion gases from four or more flues are collected in a small horizontal flue, and transferred from one side of the oven to the other by means of the cross-over flue for similar symmetrical distribution in the flues of the opposite heating wall. This system permits, therefore, a great reduction in the cross-sectional area of the horizontal flue; and as the gases in all the vertical flues on one side of the oven are passing in the same direction at any given instant, there is no tendency to leakage and by-passing into adjacent flues.

The system is equally as well adapted to large ovens with a carbonizing capacity of 30 tons of coal per day as to small gas ovens with a capacity as low as 10 tons per day. The ovens are so constructed that they can be heated with coke oven gas, producer gas, or blast furnace gas. The heating is very uniform from top to bottom and end to end of the oven, and is easily controlled. It is therefore possible to operate the ovens with a high flue temperature; thus assuring a rapid coking time and increased throughput. The results of the higher rate of carbonization have been that coals hitherto regarded as non-coking have been successfully coked in Becker ovens, and that coals which formerly required stamping may be top charged.

The installation at Charleroi consists of a complete coal handling plant, a battery of 31 Becker ovens, a coke screening station, a bye-product plant, and a benzole plant.

The carbonizing capacity of the present ovens is 710 tons per day; but the coal and coke handling plants and the bye-product apparatus are designed for the treatment of 1000 tons per day.

The coal is bought in the open market, and no fewer than eighteen different kinds are received at the plant, varying in content of volatiles from 26 p.ct to 8 p.ct. From four to five different kinds of coal are used simultaneously in the mixture for the ovens. The following results will be of interest:

Results at the Usines de Chatelineau.

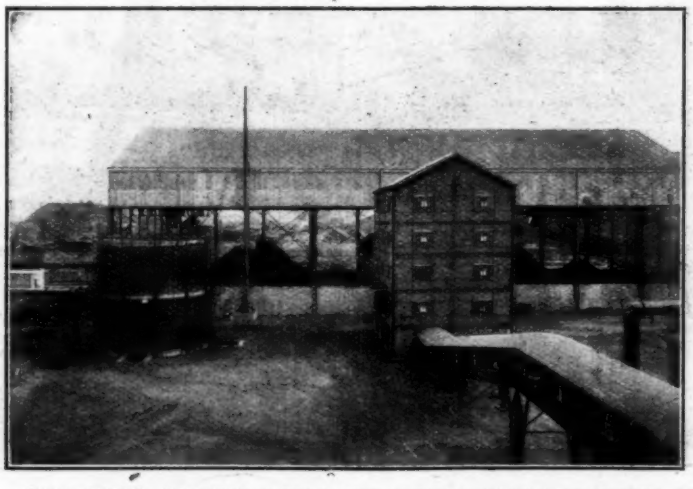
[Ten-Day Report from Aug. 21 to 31, 1927.]

Coal Charged.

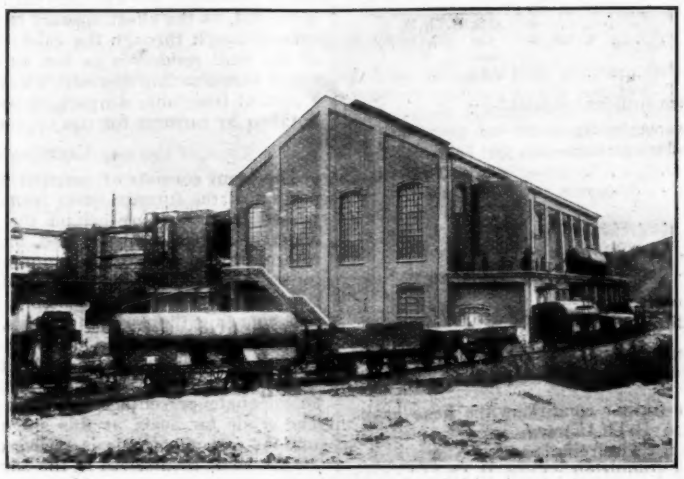
—	Gross Weight. Kg.	Moisture. P.Ct.	Ash. P.Ct.	Volatile Matter. P.Ct.	Weight Dry Coal. Kg.
Coals tested . . .	6,320,600	..	..	..	5,825,064
Average analysis of the mixture charged. .	..	7·84	8·87	22·01	..

Coke Produced.

—	Gross Weight. Kg.	Moisture. P.Ct.	Ash. P.Ct.	Weight Dry Coke. Kg.	Per Ton Dry Coal. P.Ct.
Large coke	4,311,450	1·70	11·25	4,238,155	72·76
Small coke 40–60 mm.	74,470	8·25	11·53	68,318	1·17
Small coke 25–40 mm.	177,900	16·40	11·70	148,724	2·55
Breeze 15–25 mm.	65,850	15·20	12·00	55,840	0·96
Breeze 0–15 mm.	176,800	17·79	17·60	145,506	2·49
Total	1,806,470	..	..	4,656,543	79·93



COAL STORE, CRUSHER HOUSE, AND BELT CONVEYOR TO OVENS.



THE BYE-PRODUCT PLANT.

Some coals have been washed and contain from 10 to 12 p.ct. of moisture; others are dry containing from 3 p.ct. to 4 p.ct. of moisture. The mixture used in the ovens contains an average of 22 p.ct. of volatiles, with 10 p.ct. of anthracite dust.

The battery consists of 31 Becker ovens, 16 in. wide, 12 ft. 6 in. high, and 40 ft. 8 in. long, taking a charge of 14·2 tons. They are at present operating on 17½ hours net coking time, and carbonize 594 tons of coal per day. When the coke demand for the blast furnaces or the coke oven gas requirements for the steel works increases, the coking time will be reduced. It has already been demonstrated at Chatelineau that the coal can be coked in 14¾ hours. This corresponds to a daily carbonizing capacity of 710 tons for the 31 ovens.

The coke is discharged from the oven through a guide into a quenching car equipped with an inclined bottom, and is conveyed by an electric locomotive to the quenching station, which is provided with a high hood.

The operating force at the battery consists of one foreman and ten men per shift. There are three shifts working 8 hours.

All the vital parts of the ovens, including the regenerator walls, are built of highest-grade silica bricks, furnished by the Meltham Silica Fire Brick Company, Ltd.

With regard to the bye-product plant, at the time of the visit the tar production was approximately 5·2 gallons per ton of dry coal, with a specific gravity of 1·155, and the sulphate production was approximately 23·75 lbs. per ton of dry coal. The benzole yield was about 1·7 gallons per ton of dry coal, specific gravity 0·88.

The foregoing figures, it may be pointed out, were taken during the first few months after the starting-up of the plant. It is expected that the yields will be exceeded when the plant operation settles down to an established routine, and the period of readjustment has passed.

NOTES ON TAR PLANT.

By S. A. WIKNER, F.I C.

[A Paper before the North of England Gas Managers' Association, Oct. 14, 1927.]

These notes are submitted with the object of describing briefly the processes carried on at the works to be visited by members this afternoon. Advantage has been taken of the opportunity to record in some detail our experiences in continuous distillation, and in certain refining processes, in the hope that these may be found of interest.

The St. Anthonys Bye-Products Works of the Newcastle and Gateshead Gas Company commenced operations in 1918. At this works is distilled the whole of the crude tar produced at the Company's several gas-works, together with substantial quantities purchased from neighbouring undertakings. The works occupies an area of 9½ acres, with a useful river frontage and sidings connected with the riverside branch of the L. & N.E.R. The amount of tar distilled annually is about 20,000 tons, of which 15,000 tons is transported by water at low cost in the Company's barges; the remainder arriving by rail tank wagon. For a time the first distillation only of tar was carried on; the products made and sold being crude naphtha, light oil, creosote, road tar, and pitch. This did not prove sufficiently remunerative; and in 1922 plant was installed for the manufacture of carbolic and cresylic acids, benzole, naphthas, and pyridine.

The tar distilling plant consists of three sets of Hird continuous stills, each originally of a rated capacity of 30 tons per 24 hours. Each set comprises three stills heated by breeze or small coal in external furnaces. The Hird plant is well known, and description here is unnecessary. Experience in other works had shown that Hird plants fired by gas had been successfully distilling clean tars of uniform quality, particularly when there was little tendency for the deposition of carbon on the heating tubes. Under our conditions, however, several difficulties immediately became apparent. The method of heating, particularly with tar depositing carbon, led to overheating and distortion of the still tubes, which were frequently drawn entirely out of the end plates. An early improvement was the welding of a flange on one end of the tube. This flange is bolted to the front end plate; the other end being expanded into the back plate in the usual way for convenience in fitting. The tubes have a longer life, and need renewal only when the corrosion due to chlorides becomes excessive.

Control of the process was difficult owing to the fact that small differences in the water content of the crude tar threw varying loads on the plant, causing irregularity in the quality of products and necessitating frequent adjustments of the speed of distillation. Under the most careful supervision the throughput per plant did not exceed 30 tons per day.

Operating costs were high compared with other processes in common use, due to the small quantity (10 tons) per man per shift and to the loss of radiant heat in the external furnaces. Of far worse consequence was the occurrence of violent frothing in the preheaters whenever the crude tar contained more than 5 p.ct. of water. This became so serious that it was necessary to adopt some means of removing the water before passing the tar to the Hird plant. A method of dehydration by steam was devised; and in May, 1922, at a meeting of this Association, I had the pleasure of reading a paper describing the steam dehydrator. [See "JOURNAL" for May 10, 1922.] On that occasion I was unable to tell you of the remarkable effect which the preliminary dehydration had upon the working of the Hird plant. It was found that, with the same attendance and fuel at the Hird plant, its capacity became 60 tons per day, instead of the previous average of barely 30 tons—an increase far beyond expectation. Seeking an explanation of this result, we considered the approximate theoretical heat balance of the distillation of tar.

Assume that 100 lbs. of crude tar contains 5 lbs. of water, 1 lb. of crude naphtha, 32 lbs. of oils, and 62 lbs. of pitch. Take the specific heat of tar and oils at 0·5, and the latent heat of vaporization of tar oils at 160 B.Th.U. per lb. The distillation may be divided into four stages, and the amount of heat required for each calculated as follows:

Stage 1.—Heating the crude tar from (say) 62° Fahr. to 212° Fahr.—

95 lbs. tar × 150° Fahr. × 0·5	=	7125 B.Th.U.
5 lbs. water × 150° Fahr. × 1·0	=	750 ,,
Total		7875 ,,

Stage 2.—Distilling-off the water and crude naphtha—

5 lbs. of water × 965	=	4825 B.Th.U.
1 lb. of naphtha × 160	=	160 ,,
Total		4985 ,,

Stage 3.—Heating the tar to the distilling temperature—

The oils are heated to their average boiling-points—say, 512° Fahr.
The pitch is heated to the final temperature—say, 572° Fahr.

Oils, 32 lbs. × 300 × 0·5	=	4,800 B.Th.U.
Pitch, 62 lbs. × 360 × 0·5	=	11,160 ,,
Total		15,960 ,,

Stage 4.—Distilling the oils—

32 lbs. × 160	=	5120 B.Th.U.

From these figures the heat recoverable is—

From condensation of the distilled water and naphtha	4985 B.Th.U.	(A)
From condensation of the distilled oils . .	5120 ,,	(B)
From cooling of the distilled oils	4800 ,,	(C)

It will be seen that under former conditions the heat available from B *plus* C (= 9920 B.Th.U.) was used to perform Stage 1 and part of Stage 2. The remainder of Stage 2, together with Stages 3 and 4 (requiring 24,020 B.Th.U.), was being done in the main fire-heated stills.

Under the new conditions, Stages 1 and 2 are undertaken by the steam still; the heat from B *plus* C being available to do a large portion of Stage 3. The fire-heated stills are only called upon to provide 11,760 B.Th.U.; this practically agreeing with the increased capacity found in practice.

As a result of this improved working, the operating and repair costs at the tar plant were halved, representing a saving of about 2s. per ton of tar—*i.e.*, about £2000 per annum.

Crude tar, of water content varying up to 15 p.ct., enters the dehydrator and is delivered to the tar plant practically free from water and at a uniform temperature, ensuring smoothness of working and regularity in quality of products. Further, the capacity of existing plant is doubled, giving abundant spare plant for possible extension of operations.

The dehydrator has also been applied to large installations of the usual intermittent "pot stills." By the courtesy of Mr. James McLeod, of the Glasgow Corporation Chemical Works Department, I am enabled to state that a steam dehydrator of a capacity of 100 tons per day, recently installed, has had the effect of at least doubling the throughput of tar stills (20-ton size) with preheaters of the usual type.

We have found much advantage from the use of measuring tanks fitted with float gauges showing the actual quantity of tar flowing to the plant at every hour of each shift. Another improvement is the provision of collecting tanks for pitch. These hold a day's make; and in addition to ensuring that only pitch of even and correct quality is run to the beds, it is found that the pitch cools far more quickly than when run in small continuous flow into deep beds. The main stills of the Hird plant, being of cast iron, appear likely to last indefinitely. In the presence of ammonium chloride, corrosion attacks the steel and plates and heating tubes. These, however, are of standard material and can be held in stock. A plant can be completely refitted in a few days by our own men.

Tar Acid Plant.

The oils obtained as distillates from the tar plant contain tar acids, and are treated by agitation with a solution of caustic soda. The soda combines chemically with the tar acids, forming "soda carbolate" solution, which is separated, purified by steaming, and treated with CO_2, forming soda carbonate. The crude tar acids are thrown up as an oily layer. The soda carbonate is then boiled with quicklime; caustic soda being regenerated for use again. The lime is precipitated as chalk, and this is the only waste product from the process. The inevitable loss of soda is made up by adding soda ash during causticizing. Such briefly is the well-known CO_2 process for extracting tar acids. Successful working depends largely upon reducing the soda losses, obtaining the fullest use of the lime, and keeping down the cost of labour and steam. It may be of interest to describe some of the methods evolved after much experimental work at St. Anthonys.

Causticizing.

The carbonate liquor is stored in an elevated tank, in which it is heated by exhaust steam in closed coils. We thus avoid the considerable dilution which occurs in the usual method of heating the cold liquor by blowing-in steam. Causticizing is by three successive boils; the whole of the requisite lime being put into the first charge. Each boil after agitation and test is allowed to settle, and the clear soda liquor is decanted. The first two boils, during which lime is present in excess, yield a liquor high in caustic soda. The third boil, in which the soda carbonate is in excess, ensures that practically all the lime enters into reaction, especially as by this time the lime is disintegrated into minute particles. The soda from the third boil is used, still hot, as the first boil in the next operation. The chalk sludge is dried in centrifuges lined with fine steel gauze, and is washed in the machine with hot water. Very little water is needed, as the effect appears to be that the water pushes the soda before it through the cake; and though the soda content of the final residue is as low as 0·1 p.ct., the recovered soda liquor is not unduly diluted. The residue, which contains about 1 p.ct. of free lime, 0·1 p.ct. of soda, and 25 p.ct. of moisture, is taken by farmers for use on the land.

Carbonating.

The plant consists of reaction towers packed with coke. A portion of the furnace gases from the steam boiler flues is by-passed from a point behind the flue dampers, washed with water in a coke scrubber, and, passing up the reaction towers, returns to the base of the chimney. Carbolate stored in large tanks is circulated continuously through the towers until the reaction is complete. No labour is required beyond emptying and charging the carbolate tanks, which are done in the day-time; the circulation continuing through the night without attention. This system has the advantage that the efficiency of the boiler plant is perforce kept up to the mark to ensure an adequate percentage (10 to 12 p.ct.) of CO_2 in the gases. The crude tar acids at this stage still contain an appreciable amount of soda. This is recovered by further carbonation of the tar acids themselves in the same plant. This soda is more concentrated than the main bulk, and assists in maintaining the strength of solution. Being partially bicarbonated by prolonged treatment, it is mixed in with the next charge of carbolate, with which the bicarbonate immediately reacts.

The crude tar acids are finally neutralized by a small addition of sulphuric acid, and passed to the distilling plant. A preliminary dehydration in a small steam-heated still similar in type to that used for crude tar removes the water economically, and the tar acids, now containing about 1 p.ct. of water, are distilled in fire-heated stills; 60's carbolic acid and refined cresylic acid being separated by fractionation. The preliminary dehydration appreciably increases the capacity of the somewhat expensive fractionating stills.

By these methods we are producing 100,000 gallons per annum of refined tar acids at a consumption per gallon of 0·8 lb. of soda ash, 4·5 lbs. of lime, and 0·1 lb. of B.O.V., without the need of evaporating to concentrate soda solutions. The cost of labour is low; two men operating the plant working days only. The whole of the tar acids produced is disposed of as 60's carbolic and cresylic acid to the American specification, each with under 0·5 p.ct. impurity (pyridine neutral oils, &c.).

Naphtha and Pyridine Plant.

This is the usual type, and comprises a Holmes washer and still, each of 2500 gallons capacity, with ample storage for products. The lighter distillates, together with crude benzole from the Company's Howdon Works, are rectified, giving benzole and solvent and heavy naphthas. Light oil, after removal of tar acids, is washed with dilute B.O.V., which extracts the pyridine. The washes are neutralized with soda ash in lead-lined pans. Crude pyridine separates out, and after drying with strong caustic soda is rectified by distillation.

Oil Stills.

Light oil, after extraction of tar acids and pyridine, is distilled through fractionating columns; the distillate, rich in naphthas, being transferred to the naphtha plant for rectification. Adjoining are stills for the distillation of crude tar acids and pyridine; the whole battery being worked by one man per shift.

Road Tars.

About 75 p.ct. of the crude tar is worked to produce road tar. It is our practice to distil nearly to pitch, and to thin-back with selected oils from which tar acids and naphthalene have been removed. Tar of any desired viscosity or distillation test can thus be made at will. Provision is made for the admixture of bitumen or asphalt. Bitumen is received in bulk in tank-wagons fitted with steam coils. A few hours' steaming suffices to melt the bitumen, which is then run out and thinned by the addition of creosote, in which state it can conveniently be pumped to the mixing tanks as required.

The melting of Trinidad asphalt, usually done in fire-heated pans, is a troublesome job. This material contains about 40 p.ct. of inert matter, some of which is deposited. Frequent cleaning of pans is necessary; and even then the pan bottoms burn out very quickly. We are able to make mixtures containing up to 20 p.ct. of Trinidad without fire-heat in the following manner. One ton of asphalt broken into pieces of 2 in. to 4 in. size is placed in a pan of 5 tons capacity, fitted with steam coils. A little oil is added, and then hot pitch from the tar plant is run in. The heat from this, together with steam in the coils, is sufficient to melt the asphalt; and the mixture is then thinned to the desired consistency. Though rather slow, this method is practicable.

Pitch Handling.

Pitch is stored in deep beds, and is broken out when cold by blasting with gunpowder. High explosives have a shattering effect, giving too much smalls. Using one crane and lifting skips of 30 cwt., it is possible to load up to 300 tons per day.

SCOTTISH JUNIOR GAS ASSOCIATION (EASTERN DISTRICT).

First Meeting of Session.

The Opening Meeting of the Twenty-Fourth Session was held in the Alexandra Café, Edinburgh, on Saturday, Oct. 15.

Mr. M. Darling (Cowdenbeath), the retiring President, occupied the chair, and in opening the proceedings welcomed the members and expressed his appreciation of the loyal support he had received during his year of office. In selecting Mr. E. L. Farquhar as their new President, they had made no mistake; and he trusted that Mr. Farquhar would receive the same support as he had enjoyed.

Mr. Farquhar, on taking the chair, thanked the members for the honour they had bestowed on him in electing him President of the Association. His first duty was a particularly pleasant one; and that was to present Mr. Darling, on behalf of the Association, with a mementq of his year of office. Those who had come in contact with Mr. Darling in connection with the affairs of the Association realized the deep interest he had always taken in the Scottish Juniors. His year as President had been a most successful one; and they were glad to know that they would still retain his guidance and wisdom on the Council. Mr Farquhar then presented Mr. Darling with a gold medal.

Mr. Darling suitably replied.

Mr. Farquhar said that, while following custom in leaving over the Presidential Address until later on in the season, he would like to refer riefly to one or two items with which it would be more appropriate to deal at the present time. In the first place, in regard to the Education Scheme of the Institution of Gas Engineers, he thought that the members would be interested to learn that since the last meeting greater facilities had been made available for tuition and advice. Following the Joint Meeting in London, when representatives of the Junior Associations were asked to confer with the Education Committee of the Institution, District Committees had been set up to assist students in the various areas. The main function of the District Committee was to get in touch with all present and potential students, and advise them as to the course of study they should pursue. Failing the existence of suitable facilities within any particular area, arrangements could be made by the District Committee for tuition at evening classes in the vicinity. Mr. Yule (the Hon. Secretary) and he had been elected to the Committee to represent their District. Anyone, then, who found any difficulty regarding procedure was invited to give full particulars, so that the matter might be discussed. Already a meeting of the Committee had been held; and he took this opportunity of recording appreciation of the fair, straightforward, and sympathetic manner in which cases were dealt with.

In calling upon Dr. H. Hartley to give the Opening Address, Mr. Farquhar said it was some time since the members had had the pleasure of listening to the lecturer.

THE GAS FIRE.

By Dr. Harold Hartley.

It is doubtful whether members of the gas industry who have not actually been associated with the development of the gas fire realize what a large amount of work is at the back of the present-day appliance. Changes in design have not been made haphazard, and many of them represent the application of results attained in the laboratory.

During the present century the principal changes which have been effected in the gas fire have been introduced with the following objects:

1. To satisfy the requirements of hygiene, with especial reference to the removal of the products of combustion and to the promotion of ventilation.
2. To improve upon the combustion of the gas.
3. To make the appliance silent in operation.
4. To increase thermal efficiency.

I think we may claim without exaggeration that these changes have been based principally on work which has been carried out in the laboratories of our Associated Companies or in our Central Laboratory; and in this brief review of the gas fire, I wish to consider it from this point of view.

1. Hygienic Requirements.

The old ball fuel fire was made to present a bright incandescent appearance, but it had three outstanding disadvantages:

1. Its radiant efficiency was low.
2. The combustion was often poor.
3. The products of combustion escaped from the front of the canopy.

At a later date the columnar fuel was introduced and the shallow fire developed. The early types of shallow fire were still open to the objections that the efficiency was none too high, the combustion none too good, and the products escaped from the front of the canopy unless the operation of the fire was aided by an appreciable chimney pull. The fire was, however, a marked advance on the ball fuel type.

Consumers who used gas fires acquired the habit of placing a bowl of water in front of them, because discomfort was felt when seated in rooms heated by their aid. The idea grew that the gas fire dried the air of a room. It was thought that the bowl of water provided a remedy. Even if it were a fact that these fires did dry the air of the room, of course the bowl of water would not correct the defect. It is probable that none of the advocates of the bowl of water had ever taken the trouble to calculate what amount of water vapour it would be necessary to introduce into a room to ensure that the degree of humidity did not fall as the result of the rise in temperature of the air which took place. Had this been done, it would have been realized that a small bowl of water would not correct for change in humidity. Nevertheless, the practice did indicate that the general public were not satisfied with the gas fire; and, as you are all aware, it has taken the industry a good many years to live-down this bowl of water idea. My view is that the principal trouble with these older gas fires was that, while they were not designed in such a way as to ensure that the gas was completely burnt, they emitted products of combustion into the room in which they were used.

In 1912 it was proposed that the gas fire should be so designed that all products of combustion passed through the flue outlet, even when the fire was alight in the middle of a room, unaided by any chimney pull. The proposal was endorsed by the "Lancet," who suggested their well-known test, which is now applied to the examination of fires to determine whether they satisfy this standard. Prior to the war many gas fires had been made to conform to this requirement.

At the same time the question of the ventilation of rooms was receiving consideration, and this led to the production of gas fires especially designed to promote more ventilation than had been ensured by the earlier types. Investigations in this connection showed the advantages of the secondary ventilation port which is now used with all our fires. Mr. Yates' patent application was dated August, 1913.

2. Complete Combustion of the Gas.

If coal gas is not completely burnt, then the products of combustion may have unpleasant toxic properties. Further, it will be realized that if the combustion were really poor, the thermal efficiency of the heater would be adversely affected, as an appreciable proportion of the potential energy of the coal gas would be lost. Once the gas fire had been developed so that the products of combustion were all injected into the chimney, the question of completeness of combustion became of less importance from the hygienic standpoint. When combustion in a gas fire is very poor, the products possess a characteristic pungent odour; and the better fires to which I am now referring did not give-off products possessing this smell, once they had become thoroughly heated. Nevertheless, there is always the possibility that, as a result of down-draught, some temporary obstruction of the chimney, or other cause, the products of combustion may pass into the living room. Further, a simple calculation will show that a small percentage of unburnt gases in the products passing away through the flue outlet may lead to a considerable loss of heat in the form of unburnt gas, because the products of combustion, by the time they reach the flue outlet of the fire, are very highly diluted. A careful examination was made, therefore, of the products of combustion from a gas fire to determine what unburnt gases they contained.

From the hygienic standpoint, it is particularly important that there shall be no danger of carbon monoxide—one of the products obtained when coal gas is only partly burnt—passing into the living room; and it was decided, therefore, to concentrate on the quantitative estimation of carbon monoxide in the products. The method we evolved, which permits of the accurate estimation of carbon monoxide when present only to the extent of a few parts per million, has been fully described already. In our work on the gas fire, we found that the quantity of carbon monoxide which escaped was affected both by the amount of gas being consumed and by the degree of aeration of the flame. It was also found that if an adequate aeration were provided, then under normal conditions carbon monoxide was only present in the flue gases to the extent of a few parts per million. A test of one of our standard gas fires was made using normally aerated flames, and showed that the products did not contain more than 27 parts of carbon monoxide per million, the carbon dioxide content of the sample under examination being 1·3 p.ct.; and of the 27 parts found in the products, 11 parts were due to the air of the room. The air of our large cities contains generally about 5 parts of carbon monoxide per million; while the air of a laboratory, provided with gas fittings, contains considerably more, even though no gas is being burnt. This is due to minute gas leaks which cannot be detected by ordinary methods. The report presented by the Gas Investigation Committee at a recent meeting of the Institution has confirmed that the production of carbon

monoxide by the Radiation standard fire under normal conditions is negligible.

The design of the radiant and the burner have both an important influence on the production of carbon monoxide during the working of the appliance. It by no means follows that because a particular radiant gives a satisfactory result in one fire it will be universally applicable; and in this connection the size of the teat orifice and the burner capacity, as well as the design of the brick, have to be considered. We showed recently that the undiluted products from a freely burning aerated bunsen flame did not contain more than 31 parts of carbon monoxide per million. When the secondary air supply to a flame is limited, however, the amount of carbon monoxide in the products may increase rapidly. In the design of the fire care has to be exercised, therefore, to ensure that there shall be an adequate air supply. A poorly-aerated bunsen flame gives off more CO than does a well-aerated flame; and, in addition, of course, a poorly-aerated flame requires a greater supply of secondary air to complete combustion. The degree of aeration at which burner flames in gas fires are now operated is noticeably greater than was the case some fifteen years ago; and the tendency will be so to design fires that still greater aerations can be attained. The need for ensuring the complete combustion of the gas is one of the reasons for this modification of burner design.

Originally, when the highly aerated flame was introduced into English gas fires, it was wrongly argued by some that increase of aeration *per se* would result in the attainment of much higher thermal efficiency. Referring to this matter in a lecture delivered to the London and Southern District Junior Gas Association in 1915, I said: "High aeration is not essential to the successful working of a gas fire, nor, so far as our present knowledge of the subject allows us to say, is it advantageous. The degree of aeration necessary is determined at present by that required to prevent the sooting-up of the radiants. . . . Sooting-up can be prevented by having in the flame, when the fire is hot, a defined inner cone which is not broken-up by the radiants. This condition does not demand very high aeration." And then later, after discussing means of attaining flame silence at high aeration, I said: "It is often contended that the substitution of the highly aerated flame for the sluggish flame ensures an increase in the radiant efficiency. For this view we have not found support in the result of actual experiments. Tests which have been made at Warrington in this connection indicate that the change in radiant efficiency, if any, is rather a decrease with the adoption of a highly aerated flame in the ordinary gas fire." Tests made with two typical fires were quoted. In the case of fire A, the increase in aeration resulted in a decrease in radiant efficiency; whereas in the case of fire B no change in efficiency was recorded consequent upon the increase in aeration.

Recent tests with two modern fires have confirmed that the use of a more highly aerated flame does not lead to an increase in radiant efficiency.

Tests were made at normal consumption, at 85 p.ct. normal consumption, and at 115 p.ct. normal consumption. In the case of one of the fires, the burner had an outlet orifice of $\frac{7}{64}$ in. diameter, while in the other fire the burner had an outlet orifice of $\frac{11}{64}$ in. diameter. The same radiants were used with the two fires.

Five different air-gas ratios (1·4, 1·7, 2, 2·2, and 2·8) were used in each test.

In each case the fire was most susceptible to changes in the primary aeration when it was worked at the lowest of the three consumptions. For example, with the $\frac{7}{64}$ in. outlet, as the air-gas ratio was increased from 1·4 to 2, an increase of 2 units in the radiant efficiency was recorded. A further increase in the air-gas ratio to 2·2 caused no change in the radiant efficiency, while a drop of 2·7 units occurred when this ratio was increased to 2·8. At the normal consumption, though the changes were less, increase in the air-gas ratio above 2·2 : 1 also caused a drop in the radiant efficiency. The variation in efficiency was less than one unit throughout the five experiments, and the results at the highest and lowest aeration were the same. At the high consumption over the range used the changes in the primary air supply did not affect the efficiency results.

When it is borne in mind that some 4 volumes of air were required for the complete combustion of 1 volume of the coal gas used, it will be realized that, so far as radiant efficiency is concerned, a moderate aeration is all that is required with the fires we examined. At the medium consumption with the particular coal gas used, an air-gas ratio of 2 : 1 resulted in the production of a green inner cone $1\frac{1}{2}$ in. high at a consumption of 4 c.ft. per hour per teat with the $\frac{7}{64}$ in. outlet. With an air-gas ratio of 1·4 : 1, the aeration was very poor, no defined inner cone being visible; while with an air-gas ratio of 2·8 : 1, the inner cones were of a bright blue colour and about $\frac{1}{2}$ in. long. The net calorific value of the gas was approximately 450 B.Th.U. per c.ft.

The experiments showed that with the $\frac{11}{64}$ in. outlet no advantage resulted on increasing the air-gas ratio beyond 2·2. Further, it was found that, as was to be expected, the fall in efficiency at the higher aerations used in the tests was not so great as with the smaller flame orifice, and with the larger outlet it was desirable to use a slightly higher aeration than with the smaller outlet.

There is not sufficient information to enable the best degree of aeration to be specified for all qualities of gas; and it is not improbable that the various gases of a given calorific value may require different proportions of primary air to enable the best efficiency results to be attained. For example, whereas in the experiments with the $\frac{7}{64}$ in. outlet an air-gas ratio of 2 : 1 was desirable, it is conceivable that with other gases of the same calorific value a somewhat higher, or a somewhat lower, air-gas ratio might be more suitable. Both burners are capable of giving in ordinary domestic use more highly aerated flames than are represented by the above air-gas ratios of 2 : 1 and 2·2 : 1. In actual practice the expedient is adopted of adjusting the fire until a flame of a given appearance is obtained. This procedure has much to recommend it, and when used the results attained with a fire will not fall far short of the best which it is capable of yielding.

I anticipate that future developments will be in the direction of the production of more highly aerated flames than are recommended in the majority of gas fires to-day. Such changes, however, if introduced in the present type of columnar radiant fire, will not be made in the hope of increasing radiant efficiency, and may actually involve adjustments of burner and radiant details to enable the efficiency to be maintained.

I have avoided quoting percentage radiant efficiency in the above data, because there is reason to believe that the standard methods of determining radiant efficiency do not give absolute results in all cases, although they may enable comparative results to be attained with fires of the same shape and size. It is not improbable that the results recorded may be considerably lower than the true radiant efficiency. In 1915 I stated that the over-all heating efficiency of a gas fire was about 60 p.ct. This conclusion was reached as the result of experiments which had been carried out to enable the heat-balance of a typical fire to be struck. If a fire has an over-all efficiency of 60 p.ct., and is of the modern type provided with a relatively small surround, then its radiant efficiency must not be far short of this figure. Certainly I should expect it to be greater than 55 p.ct. in such a case.

Some years ago we made a comparison between the results attained with the "B.C.Y." bolometer and our block radiometer. This comparison involved the carrying out of tests at various distances from a gas fire. At the same time the efficiency of the fire was calculated by the "B.C.Y." short-cut method. The results provided further support for the view that the amount of energy given off as convected heat by the modern gas fire is small. As time allows, we are continuing our experiments in this direction. The results attained to date suggest that it may be necessary for us to recommend a modification of the accepted method of gas fire testing.

3. Silent Operation.

One of the first silent gas injectors was made available in 1913, and was described in a lecture which I gave to the Yorkshire Junior Gas Association during that year. With this injector an endeavour was made to attain silence by means of a single control. The gas issued from a series of tapering channels provided in the exit of the injector by the use of a serrated needle. This type of injector can be made to work fairly silently up to pressure of about 4 in. w.g. Generally, however, the single control type fails to give satisfactory silence at higher pressures. Later the dual control system, which is now our standard, was introduced; and this has the advantage that it gives much greater elasticity than the single control, and injector hiss can be eliminated over a greater range of pressure. The two controls employed permit of adjustment for pressure and for calorific value. The pressure control is within the body of the fitting; and compensation for the calorific value is effected by variations in the number of outlet holes.

The conditions which must be satisfied by a gas injector in order to avoid jet noise have been re-investigated in recent years in our Central Research Laboratory, with interesting results. The noise associated with the escape of gas from an injector may be due to the production of vibrations or eddies in the gas stream as it issues from the injector nozzle, as well as to turbulence set up in the fitting itself. If the issuing stream of gas had not to entrain the primary air as it passed into the burner, there would be no difficulty in producing a gas fitting which was absolutely quiet in operation. Unfortunately, the complete elimination of noise does interfere with the injector efficiency of the appliance. It is, however, possible so to design an injector that for all practical purposes it will be silent, and yet produce with it well-aerated flames in a gas fire burner. The noise made by an injector is either a "soft" noise, or of a harsh type, somewhat resembling a whistle. By a "soft" noise, I mean low frequency noise which is barely distinct at a distance of 2 or 3 ft. from an injector in a quiet room. If there is but a small amount of external noise, then it is difficult to detect the soft noise at such a distance from the source. The harsher type of noise is of a higher frequency, and when produced is more noticeable. If an injector is tested away from a burner, it will be found that the sound it emits is much smaller. The burner body appears to act as a resonating chamber, and to increase the audibility of the vibrations. The

injector, therefore, should not be examined apart from the burner, but when operating in conjunction with that burner for which it is designed.

In the past the designing of gas fire burners has been more or less an art. A certain amount of knowledge and finger skill enabled fairly well aerated flames of uniform height to be produced; but we felt it to be important that the factors which influence the aerating capacity of an injector and a burner should be submitted to detailed analysis. We are now in a position to define the maximum degree of aeration which is attainable with a given teat at a specified consumption and pressure, the size of the burner choke in relation to the capacity of the teat outlet, and the configuration of the interior of the burner to enable the maximum injector efficiency to be attained —that is, the maximum aeration consistent with uniform distribution of gas to the outlets. On examining some gas fire burners, it is found that the expedient has been adopted of introducing resistances within the burner body to enable the required distribution of the gas and air to be effected. Such a method is obviously not ideal, as it involves an increase in the total resistance of the burner.

We investigated a good many years ago the conditions necessary for the production of silent flames, and showed it was essential that eddies in the gas stream should be eliminated if silent burning was to result. As a consequence of this work, some form or other of eddy filter is now provided, not only in our own gas fire burners, but in those of all British makers. The filter used should also prevent lighting-back of the gas-air mixture through the burner. One of the earliest filters we employed was in the form of a grid made up from a number of metal plates spaced at a distance of about $\frac{1}{16}$ in. apart. This filter was introduced into the gas-way within the burner (Patent No. 23592/1914). While it was found that such grids can be made to work satisfactorily, the system was open to the objection that it complicated the construction of the burner—this objection being especially noticeable in the case of the duplex type of burner. As you are aware, in our standard fires we employ a perforated steatite disc incorporated in the burner teat which is fitted into the top face of the burner casting. The gas is burnt at the outlet above the disc, and the filter satisfies the requirements mentioned previously.

Future Developments.

The system of heating rooms in this country by radiant energy is well established, and it does not appear likely that there will be any marked departure in the near future from this principle of heating. At various times during the period under discussion, investigations have been carried out as to the possibility of supplementing radiant heating by convective heating, as there are met occasionally domestic conditions when primary convected heat, if attainable, would be of value. If the fresh air entering a living room has a temperature of 45° Fahr., there is produced a sensation of chill as it flows past our bodies, even though the speed of travel of the air is low. If the air temperature is raised to 55° Fahr., this sensation is generally not produced. The difficulty with which a gas fire maker is confronted is to produce an effective convector device within the limits of the size of the fire. A careful striking of the heat balance of the modern gas fire has shown that the use of a convector device in the canopy, or the leading of air over the plain back of the fire cannot result in the production of an amount of convected heat equivalent to more than 1 or 2 p.ct. of the energy available in the gas. To obtain any considerable amount of convected heat from the gas fire it would be necessary largely to increase its over-all size. In certain "build-in" fires which have surrounds, some additional convected heat can be obtained by bringing the hot products into contact with the framework castings. Even under the most favourable conditions the energy attained does not exceed 2 to 3 p.ct.; and this is decreased under the influence of chimney pull.

If an appreciable amount of the energy which now passes into the chimney could be transmitted to the room as convected heat, and this were done in such a way that the air was not raised to an unduly high temperature, then the result would be a distinct gain. In view of the importance of the price factor, it is not likely, however, that an effective convector device will be supplied with the "simple hire" gas fire in the near future. The endeavour will probably be to effect increase in radiant efficiency; but so long as the present type of fire is made, it does not seem likely that any considerable increases will be effected. The development in the immediate future will be concerned with improving the quality rather than the quantity of the energy which is emitted by the fire. This is a phase in gas fire development which we initiated some years ago; and our work holds out the promise of useful results.

Some people complain that they cannot sit in front of a gas fire, as the heat scorches them. At first sight it might be thought that this criticism is the result of an individual sitting too near to the fire. A closer examination of the question, however, suggests that may not be the whole explanation. In wintry weather it is necessary that our bodies shall receive a considerable amount of energy from the fire; and, in view of this fact, it is important that endeavour shall be made to ensure that the quality of the energy is satisfactory.

It has been stated also as another disadvantage of the modern gas fire that it provides too much short wave-length energy. These two criticisms are to some extent contradictory, and it is probable that the latter statement is inaccurate.

Scorching may result from one of two causes:

(*a*) Unsatisfactory distribution of the radiant heat relative to its source.

(*b*) Unsatisfactory characteristics of the energy emitted.

In the case of a flat-fronted fire, the horizontal distribution of energy is determined with a fair degree of accuracy by the ordinary cosine law of distribution. While with a bow-fronted fire a greater proportion of the energy is directed towards the sides of the room. The intensity of the energy falling upon a person seated in front of a gas fire is also determined by the distance from the fire, and it is possible to adjust the position occupied to suit the heat requirements. It is not, however, possible for the ordinary gas fire user to vary the quality of the energy received; and it will be of interest to consider some of the effects of radiant heat on the human body.

There is a considerable mass of evidence in support of the contention that the universal light bath owes its effectiveness in a large measure to the amount of visible and near infra-red energy which it provides. It appears to be generally accepted that the short wave-length energy obtainable in the ultra-violet region of the spectrum has a definite therapeutic value. Energy of this wave-length has a "biologic" value resulting principally from its cell-destroying powers. It is also realized, however, not to be desirable to expose the body unduly to such short wave-length energy. Energy in the visible and near infra-red region of the spectrum has a "stimulative" value, and this may be due to the penetrating powers possessed by its rays. Energy within the wave-length region 4400 A. to 14,000 A. is capable of penetrating the epidermis and directly warming the blood-stream; and when the naked body is exposed to such energy, subcutaneous temperatures are attained which are actually higher than those at the surface of the body where exposed to the source. When the body is exposed to a source emitting only the long infra-red radiation, the depth temperature is lower than the temperature attained on the surface. Further, a higher intensity of incident energy can be borne without discomfort when the energy is of the quality defined by this range of wave-length than is possible when the source emits only energy falling within the long infra-red region. The reflective power of the skin for visible energy appears to be considerably higher than for the long infra-red energy. Thus, any increase of the short wave-length energy at the expense of the long infra-red will produce desirable results. The tendency to produce scorching will be decreased, while the depth temperature of the body will be increased.

Spectroscopic examination of the energy emitted by a radiant heat source provides information as to the variation in the quality of the energy which is being effected, but spectroscopic examination alone will not provide the necessary information as to the improvement which may have been effected in the heat source. As a result of our spectroscopic examinations, we have been able to effect modifications in our gas fires, which have resulted in improvements in the quality of the energy which they emit; the improvements having been confirmed by observation of the effect of the energy on the human body.

Discussion.

Mr. FARQUHAR said it was essential that they should push the sale of gas for heating purposes. At one time no attention was given to the fundamental principle of obtaining the maximum of radiant heat, and a stuffy atmosphere was considered unavoidable. Dr. Hartley had outlined the work which had brought the gas fire to such a high standard of perfection. The question of ventilation was receiving closer study, and he (the speaker) was surprised that strenuous efforts to ensure a clear atmosphere had not been made before. In ensuring the ventilation of apartments, the gas fire had a substantial advantage over electric radiators. This should be made a chief selling point. It occurred to him that fires might be made more attractive if a coloured fuel were used. The white radiant, when the fire was extinguished, had a cold effect.

Mr. RICHMOND (Penicuik) asked whether it would not be possible to supply cookers with a flat top.

Mr. GAVIN (Kirkcaldy) referred to Dr. Hartley's remarks in connection with the position of the canopy and the flue outlet. Would the "Sunbeam" type of fire cut out the chilling effects in the same way as did the vertical type?

Dr. HARTLEY said that a coloured radiant was farther away than ever. In regard to cooker top design, heat was lost with a closed top. Even with the semi-solid top now supplied with the "New World" cooker there was a loss of 7 p.ct. efficiency compared with the serrated top—from 50 p.ct. to 43 p.ct. Referring to the position of the canopy and the flue outlet, and the resultant elimination of the chilling effect with the new fires, he considered that the "Sunbeam" would function in a similar manner to the upright fire.

Vote of Thanks.

Mr. FARQUHAR proposed a vote of thanks to Dr. Hartley, which was carried with acclamation, and Dr. HARTLEY replied.

Mr. A. E. Podmore, senior partner in Messrs. A. E. Podmore & Co., of Charles Street, Hatton Garden, left estate of the value of £6874.

GAS APPLIANCES SEEN AT THEIR BEST.

In Messrs. William Sugg & Co.'s New Showrooms.

Good gas appliances—and we are now about to refer to a firm that has for a great number of years enjoyed a reputation for supplying goods of first-class quality—like other things, are seen at their best in tasteful, well-arranged surroundings, with no suggestion of overcrowding. With this fact in mind, Messrs. William Sugg & Co., Ltd., have, at Ranelagh Works, Chapter Street, Westminster, beautifully fitted up a new showroom, about 60 ft. long and 30 ft. wide, one-half of which is devoted to heating and the other to cooking apparatus. In the former there is very effective "Dekart" dark oak panelling and ceiling beam. The furnishings match this, and the general effect is much enhanced by stained glass windows, decorated with various civic arms. The whole scheme will be better realized from the photograph than from any detail description. At the other end of the showroom white walls and ceiling appropriately suggest the cleanliness of gas cooking.

Fires.

In an ingle-nook built into the oak-panelled end of the room there is, as will be noted, a large "Metro-Log" gas fire, in a handsome wrought-iron dog grate. Elsewhere dog grates are shown in many attractive designs and sizes, made specially to accommodate this popular type of fire. "Red Knight" gas fires are there, for drawing room, dining room, and bedroom, in tiled surrounds, with artistic mantels, which may be selected to suit the scheme of decoration. The finishes are in various styles, including enamel, and a particularly beautiful rustless steel; and the models are inset, interior, and independent.

The "Red Knight" is the fire which was described in the "Journal" for Dec. 1 last. It was new at that time; but now the firm are experiencing a large demand for it. What one notices at once with this fire is the incurving or concave arrangement of the radiants, which has for its object the ensuring of perfect ventilation even in cases where the existing grate canopies are of short, or shallow, projection. Another feature is the special construction of the burner, which has a vertical arrangement of gas feed, served from the centre of the fire. This, together with the patented design of atomizer, results in absolute quiet under working conditions, as well as during the operations of lighting and extinguishing. The burner is fitted with pressure control and gas regulation; and it can be easily removed—all that is necessary being the manipulation of two screws—leaving the radiants in position.

The inset pattern is readily adaptable to varying widths of grate openings, through the employment of two metal strips which fit behind the stiles of the fire, and over or into the grate mouldings. The metal strips can be easily cut to the desired size. The stiles are common to all sizes, thus reducing stock requirements. Similarly, the ornamental front plates are interchangeable between the three different sizes of fire. For use in housing schemes, the "Red Knight" fire is made in one piece with cast-iron fender and mantel.

Cooking.

The end of the showroom which is fitted up as a kitchen contains a first-rate selection of cooking apparatus suitable for the home, as well as for hotels, restaurants, refreshment rooms, public institutions, mess-rooms, &c. The firm's well-known "Chef" series of cookers is on view—including the "Bijou" model, which has only recently been introduced as a convenient size to meet present-day conditions in the matter of available space. Of course, the "Chef" can also be had in the modern stand, or "eye-level," form. Among the larger cooking apparatus—in which Messrs. Sugg have always specialized—is a "Sutherland" confectioner's baking oven.

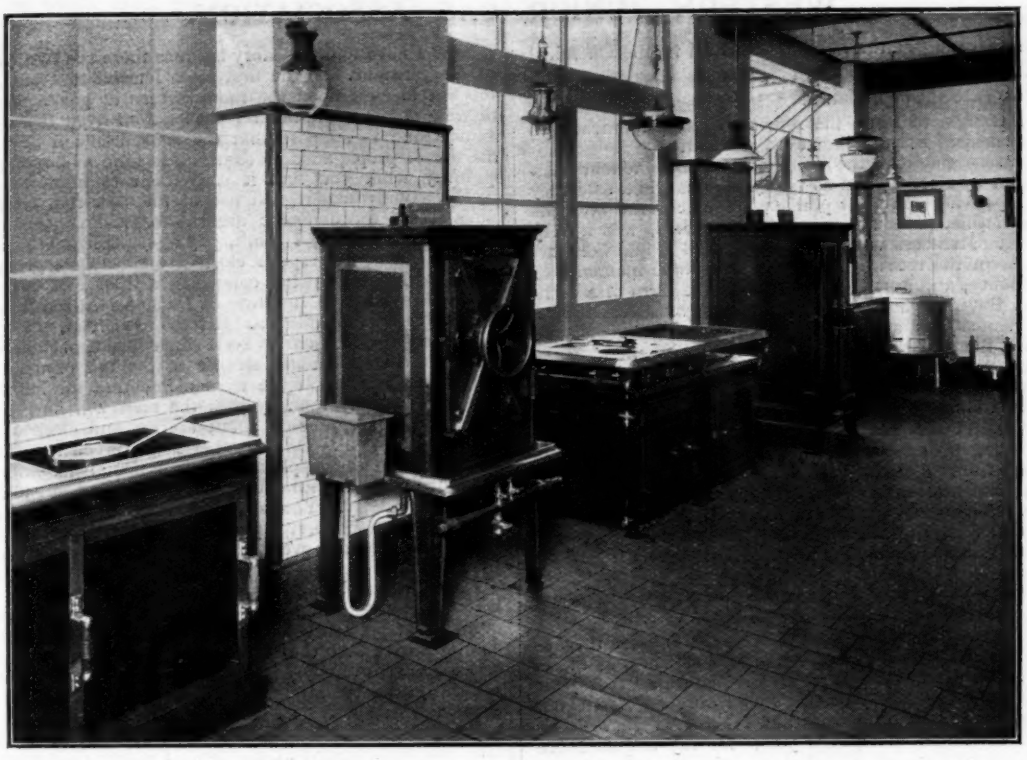
SHOWING INGLE-NOOK WITH "METRO-LOG" FIRE.

"N.S.C." Governor.

Nearby is a demonstration bench, fitted with gas fires and geyser, for demonstrating the "N.S.C." governor, the usefulness of which is shown by means of a pressure gauge. This governor is equally applicable to gas cookers, ensuring uniform heat and uniform consumption at all times, regardless of varying main pressures. It is provided with a leather diaphragm—no mercury is used—and as it works equally well in either a vertical or a horizontal position, it can be introduced into the gas supply at any convenient point.

Lighting.

In the showroom of a firm which has for so long been prominently associated with this branch of the industry, lighting fittings naturally provide a feature. In the ceiling are efficient ventilating lamps; and there are also fittings designed to meet the special requirements of church, factory, shop, and office lighting. It is not possible to particularize here; but perhaps a word may be spared for the new "Directive" burner, intended for the lighting of shop-windows, showrooms, art schools, &c. This is a novel and neat fitting of pleasing appearance, designed to focus a powerful light on any desired object. For the home, too, there is a wide range of patterns which, by beauty of design and good workmanship, are qualified to take

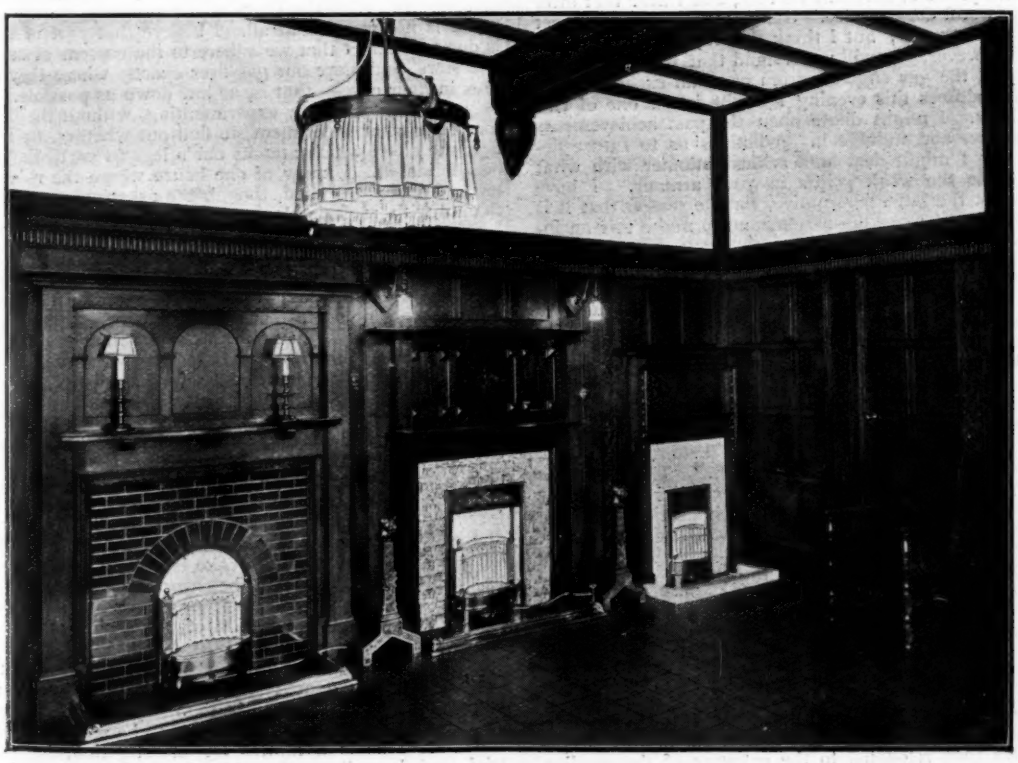


LARGE GAS COOKING APPARATUS FOR HOTELS, &c.

a place amidst the most elaborate, as well as the most simple, surroundings.

Distant Control.

The lights in the showroom are fitted with Sugg's patent distant control device—a reliable method, which does not necessitate the running of any special pipes. Any number of lamps provided with this device can be lighted or extinguished by a single control tap fixed in the gas service at some convenient position, or the lamps can be controlled in series, providing a control tap is fitted in each service to the series. When a lamp is out of lighting, the by-pass jet on the lamp is kept going by a small supply of gas which reaches it through the by-pass of the control cock, the service pipe, and the device fitted on the lamp; but as soon as the control tap is turned on, the gas pressure inflates the leather diaphragm of the device, thereby lifting the valve, and allowing gas to reach the mantles. At the same time as the main or burner valve is lifted off its seating, the by-pass valve is lifted into its seating, and the by-pass supply is shut off except for a very small amount passing through the small hole below the valve seating. A shopkeeper may, from some convenient point inside his premises, by simply turning a single tap, at once illuminate the whole place inside and out. Similarly, it is an excellent device for factories, warehouses, and offices, and particularly for church lighting, for it is often desirable to illuminate a church in the course of the service.



"RED KNIGHT" FIRES WITH HANDSOME SURROUNDS.

WESTERN JUNIOR GAS ASSOCIATION.

The First Meeting of the Session was held in the Chemical Lecture Theatre of the Merchant Venturers' Technical College, Bristol, on Saturday, Oct. 8.

Mr. C. Bateman, of Bath, the retiring President, introduced Mr. A. Marsden, of Bristol, the new President.

Mr. Marsden thanked the members for the honour conferred on him by electing him as their President, and said they could rely upon his doing all possible to further the interests of the Association. His first duty, he remarked, was a very pleasant one. Members would remember that it had been decided to present the retiring President with some memento of his year of office, and that this should take the form of a certificate. Mr. Bateman had carried through most successfully a difficult year of office; and he (the speaker) had great pleasure in presenting the certificate on behalf of the Association.

Mr. Bateman, replying, said he was very pleased indeed to have the certificate, and assured them of his continued interest in the Association.

The President remarked that they were particularly fortunate in having with them Dr. M. W. Travers, F.R.S. Some of them might not be aware that Dr. Travers was no stranger to Bristol; and he (the speaker) would remind them that, of illustrious scientists who had occupied the Chair of Chemistry in Bristol University, Dr. Travers was third, having been preceded by Sir William Ramsay and Prof. Young.

PROBLEMS OF THE NEAR FUTURE.

By Dr. M. W. Travers, F.R.S.

I have on many occasions read with great interest the addresses delivered to your Junior Associations, learning therefrom the views of men responsible for the conduct of your industry as to its present problems and future developments. It was therefore with diffidence that I accepted your President's kind invitation to address you; for my acquaintance with your industry covers a period of only some five years, and during that time I have devoted myself to the study of certain special problems, remaining totally ignorant of many subjects which are of the greatest importance to yourselves. Yet, it may amuse you to hear that in the course of my varied career I was once a gas-works manager. I left Bristol twenty-one years ago for India, to organize and direct an institution for scientific research. Like many men who go out to India, I had to undertake unexpected duties, and mine involved the building of a small town, and installing gas, electricity, water supply, &c. My gas-works consisted of a Mansfield oil-gas plant, with a 2000 c.ft. gasholder. One day, while I was in the hills, just before term was about to commence, I received a telegram: "Gasholder collapsed, please send instructions." I returned to my headquarters to find that some meddlesome individual had let the water out of the tank, and the gasholder had collapsed like a crushed paper bag. However, we hammered it out, and patched it with pieces of kerosene oil tins; and I hear that after fifteen years it still does service. Gas managers have to meet all kinds of emergencies; but I think that my experience must be unique. However, you will understand that I appreciate the responsibility of the gas engineer from personal experience.

Now in my address this evening I might follow one of two alternative lines. I might dilate upon the past achievements of your industry, and indulge in predictions as to future developments; or I might deal in a critical manner with what I consider to be the weak points in your armour. I have decided to adopt the latter alternative, for the reason that it is the more likely to provoke discussion, and to make this an interesting meeting. However, I hope that you will not think that I do not appreciate the work which is being done within the industry, or that I have an idea that gas is shortly to be replaced by electricity. It is my own opinion that there is plenty of room for both, and that competition will do neither harm, and will be of benefit to the public.

I will now remind you of a story, with which many of you may be well acquainted. In a book called "A Yankee at the Court of King Arthur," by Mark Twain, there is a description of a banquet in the great hall of the castle, which is referred to as being illuminated by "flaming rags, floating in oil, producing what in those days they called light." The transition from flaming rags, floating in oil, through candles to batswing burners is a measure of the progress of civilization from the time of King Arthur up to about forty years ago. No doubt King Arthur thought that the flaming gas was the latest and final form of illumination; but you have only to turn to the "Journal of Gas Lighting" for about the year 1880 to realize that the gas industry was really annoyed at the suggestion that the batswing burner, or possibly the argand burner, was not the final word in scientific lighting, and considered that the electric glow lamp was nothing more than a rather dangerous toy.

Littera scripta manet. Had not the work of Auer von Welsbach come to fruition in the early 'eighties, gas lighting would long ago have been relegated to the category of the candles, or even of the flaming rags.

Now I have told this story because there are two weak points in your armour. In the first place I think that you are rather too apt to look upon the manufacture of gas from the point of view of the manufacturer rather than from that of the consumer, and to suppose that the consumer can be induced by the use of propaganda to continue to take in larger and larger quantity what you find it convenient to manufacture. You have certainly made good use of the fact that circumstances have forced the domestic user to consider convenience rather than taste, without, I think, paying sufficient attention to the fact that in many respects electricity gives even greater advantages to the seeker after convenience than does gas. In a recent address to the Institute of Fuel, Sir Alfred Mond told of his impressions in America. It was the women, whose domestic conditions forced them to seek convenience, who were responsible for the enormous increase in the use of domestic electricity in Canada. If the women find that the home is better run by electricity than by gas, the men will have to foot the bills, and no arguments about therms and electric units will cut any ice at all. On the other hand, much too much in the way of developing appliances for the use of gas—not to speak of plant for the manufacture of gas—is being left to firms outside the industry. You must remember that it is a matter of no difficulty to convert a plant for producing gas ovens to one for making electric ovens; but you must manufacture gas or shut down.

Now I want to start my criticisms from within my own house. You will doubtless correct me when I say that a gas oven, as at present sold, is a much less efficient machine for baking a cake than the oven of a kitchener fired with solid fuel, or an electric oven. It is obvious that the distribution of heat in an oven heated by burners at the bottom must be very uneven, and that if the shelf of an oven is covered with articles in the process of cooking, they must be overheated at the bottom and underheated at the top. I notice that when demonstrations of gas-cooking appliances are given, the cakes which are baked are small compared with the oven area. Let the demonstrator cover his shelf with cakes, and he will obtain the result which theory predicts. He, or she, will find it easier to burn the bottom of the cake than to brown the top. This is the reason why the electric cooker has proved such an enormous success in Canada and in the United States. Is it impossible to find some means of distributing the heat more uniformly in the oven, and allowing less heat and less waste gas to escape into the kitchen?

The next question I would raise is this. Does anyone really like a gas fire? Why does one so commonly hear the remark: "We use the gas in the dining-room, but, of course, we always sit by a coal fire in the evening." Often my friends say bluntly: "I hate a gas fire." Frankly, I hate a gas fire myself; for if I spend an evening in front of one, I suffer—and it is a common experience—from trouble akin to the evil effect of sunburn. Also the room is not properly warmed, and the house is not warmed at all. I believe that part of the trouble is due to the fact that we adhere to the custom of our barbaric ancestors, and place our gas fires exactly where they made the fires in their caves—that is, as low down as possible. It would be worth while actually experimenting, without the bias of custom to hamper experiment, to find out whether, by raising the fire, the effect which attacks one's legs in particular could not be eliminated. I know of one house where the raising of the level of a fire was tried, though the experiment was not intentional, with remarkable results. I would also suggest that heating by pure and intense radiation does not suit everyone; but the only gas heaters suitable for installation in ordinary houses are of the type to which I refer.

Now I want to say a word about constant hot water boilers, but I am not going to repeat the common complaint about the grading of coke. You know all about that, even though you do not grade your coke. I have possessed two constant hot water boilers. My present boiler has four controls, and I never succeeded in keeping it alight all night till I put three of the four controls permanently out of action. I am sure that if the manufacturer had consulted an intelligent stoker he would have advised him not to cast the grate with cross pieces between the bars. As it is constructed, it is impossible to insert a hook or slice from below, and to draw the pieces of stone and clinker forward. Cleaning the fire is a dusty and laborious process, and involves pulling a great part of the fire out on to the floor. Charging the machine with coke is made extra difficult owing to the fact that the hole in the cover is not concentric with the boiler. If you want to induce people to use more coke, you should look into this question of the design of constant hot water boilers.

Leaving the home for the workshop, I would raise the question: What is the actual requirement of industry, and particularly of minor industry, in the matter of calorific value? I believe that it is generally admitted to be somewhat below 500 B.Th.U. This is a matter for investigation, for the industrial load is well worth cultivating. In many industries in which goods are put through a process of annealing, or of heat

treatment, in which exact temperatures are required, slight variation of this temperature means destruction of the product. Gas is here an ideal fuel. Keen competition, calling for an elimination of waste, and particularly for the elimination of waste resulting from the spoiling of products at an advanced stage in the process of manufacture, calls for refined methods, such as the use of gas-fired ovens and furnaces. However, this demand is to be catered for, and the users of this class are little influenced by mere propaganda.

At this point I should like to raise the question—Is it consistent with public policy that a very considerable proportion of the gas supplied by the gas industry in one of the greatest fuel producing countries of the world should be the product of imported oil? What is the industry doing with a view to correcting this evil, for it is undoubtedly an evil economically? I really do not see that anything is being done, unless it is hoped that the proposed experiment on the carbonization of coal, which is being carried out by the Gas Light and Coke Company in conjunction with the Fuel Research Board is a step in this direction. It does not seem a very promising step. It appears certain that the production of the small quantity of moderately rich gas by the process could only be of negligible assistance in maintaining a calorific value and allowing of the use of water gas without carburetting. Also, it appears that the production of gas in the process of low-temperature carbonization results from the inefficient cracking of useful volatiles. Knowledge of the exact nature of the oils obtained by low-temperature distillation of bituminous coals, and as to whether any considerable proportion of these oils could be used for the carburetting of water gas, which could have been ascertained by small-scale experiments, appears to be lacking.

My experience in industry has brought me into contact with the manufacture of steel and glass—particularly the latter—and it has been a matter for astonishment to me that the built-in gas producer is commonly installed by the gas industry, while it is regarded as obsolete in the steel and glass industries. In any up-to-date glass plant the gas is generated by a mechanically operated gas producer, or battery of producers, which is perfectly continuous in operation, and is fed and ashed-out mechanically. The quality of gas produced is uniform, and the temperature of the furnaces remains equally uniform, and does not vary as in the case of a plant supplied with gas from a producer or producers which are fed and clinkered intermittently. I know that a few gas plants have central producers, and that the central producer is becoming common in the United States. One of the advantages of the central mechanically-operated producer is that it gasifies inferior fuel—slack or breeze. No doubt research is still required to perfect the machines for universal use in gas-works. However, if coke is really worth the price which I pay for it in Bristol, it is too expensive a fuel for gasification for heating the settings.

My own interest in the industry has centred in the manufacture of water gas and in the complete gasification of coal.

I have made a very careful study of the water gas process, and about two years ago I published a complete analysis of the process as operated in accordance with British gas-works practice under the title of "A Critical Study of the Results of Tests on Water Gas Plants." In this paper I indicate certain lines of investigation. I suggest that an investigation should be carried out in which the depth of fuel, the velocity of the blast, and the grading of the fuel should be varied independently. The result would throw definite light on the conditions which make for efficiency in water gas manufacture. The experiment would not be costly, for it would only involve setting aside a relatively small water gas set, and providing it with a blowing fan suitable for the purpose, meters for measuring the air and steam, &c. The gas would not be wasted. Only a large concern could carry out such experiments, but they would be of great value to the industry. Also, the process of carburetting requires further investigation, particularly in view of the certainty that the cracking and fixing processes are very different in character; the former involving the volatilization and cracking of the oil, without contact, and the latter being a process in which catalysis at a solid surface plays an essential part. It may be that the larger concerns have studied these problems; and if they have done so, it would be for the benefit of the industry, and to the disadvantage of no one, to make the results public. If on the other hand the industry is under the impression that the makers of plant know all about the matter, I think that it is mistaken in principle, and probably also in point of fact.

Another matter which has interested me greatly is the complete gasification of coal for town gas. I came to study this matter five years ago; and on looking through works on gas making and through patent literature, I came to the conclusion that, while a vast number of processes had been proposed, the subject had never been studied from the scientific and technical standpoints, and there was no sound basis from which to attack it. It seemed generally to have been assumed that if a water gas plant were operated with coal, after being so modified that the water gas only would pass through the coal in the upper part of the generator—the blow gas being diverted at the level of the top of the coke in the lower part of the generator—the sensible heat carried by the water gas would be sufficient to carbonize the coal. Study of the thermal changes taking place in the process showed that, even if the plant was further modified so that the water gas could be superheated within reasonable limits, the quantity generated from the coke was insufficient to carry the heat required to carbonize the coal, to the extent of about one-half. This investigation showed the limitations of the water gas process as applied to coal, and led to the development of a process which has been described elsewhere.

The difficulty of developing a process for the complete gasification of coal lies in the fact that it must actually involve three processes—the carbonization of the coal, the gasification of the coke, and the enriching of the gas. As most of you realize that the simpler water gas process as operated to-day took years to develop, you will also understand that finality in the complete gasification of coal is not to be attained in the brief space of five years. However, as the result of intensive study on plants of capacities ranging from a nominal capacity of 300,000 c.ft. to ones of 1,000,000 c.ft., I think that I may be permitted to say that those with whom I am associated in this matter believe that we have made very satisfactory progress. We have certainly succeeded in carbonizing coals of only very moderate quality at a satisfactory rate without any appearance of a core in the generator, which represents a great advance over earlier experience. The efficient gasification of the coke, and the production of a gas of calorific value of over 360 B.Th.U. and with an inert content of not more than that which is usual in water gas practice (really the easiest part of the problem) have been satisfactorily accomplished. The last part of the problem, that of carburetting the gas, has given a certain amount of trouble; but in view of the results of a recent investigation, I have no hesitation in saying that the difficulties will be easily overcome. Several very good friends within the industry who are interested in the matter have been most helpful and encouraging.

Discussion.

The PRESIDENT said he was struck by Dr. Travers' knowledge of female psychology as applied to gas appliances. One of the chief objections to the distribution of low calorific value gas would be the increased load on the distribution system. He agreed with Dr Travers' remarks regarding low-temperature carbonization, and mentioned that the results from the experimental plant at Richmond would be looked forward to with great interest.

Mr. BATEMAN (Bath) said he did not agree with Dr. Travers when he stated that 400 to 450 B.Th.U. was a better declared calorific value than about 500 B.Th.U. From his experience and that of many gas engineers, the higher value was preferable. As regards the utilization of gas, he could not agree with Dr. Travers, as he considered that the researches carried out by the Birmingham Corporation and the Gas Light and Coke Company had gone deeply into this matter.

Mr. HOLE (Bath), with regard to the coke boilers, suggested a sloping grate to overcome clinkering.

Mr. PATERSON (Bath) said that people who had objections to gas fires had only had experience of the old type. He could not agree with Dr. Travers that convected heat was better than the radiant heat of present-day gas fires.

Mr. ROBERTSON (Chief Engineer to the Bristol Gas Company) remarked that, before proposing a vote of thanks to the author, he would like to say how he enjoyed the address. He agreed with Dr. Travers' statement as to the lack of co-operation between the gas industry and gas plant manufacturers, in whose hands they were almost helpless. He hoped that now Dr. Travers had returned to Bristol, he would not forsake the industry.

Dr. TRAVERS replied that he had mentioned no figure, but called attention to the need for investigating the requirements of industry, which were not identical with those of the domestic consumer. The Birmingham Gas Department set a good example.

Lead and Yarn for Joints.

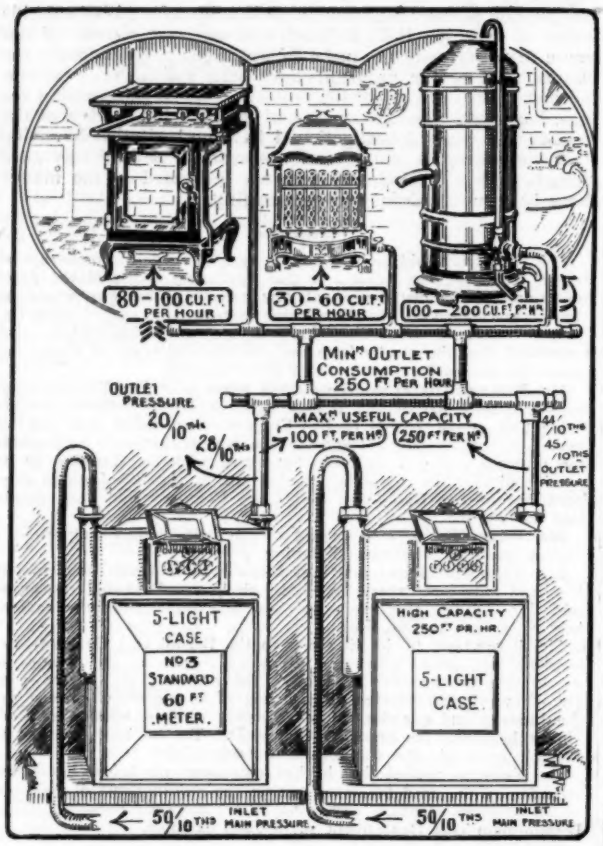
Discussing the making of lead joints, Mr. Alten S. Miller (Vice-President of the Bartlett-Hayward Company) is reported by the "American Gas Journal" to have said that the yarn should be impregnated with a filler that will not destroy its elasticity, and will not dissolve in gas. This point seems to be fully understood by the engineer in packing joints to hold oil and water, but is usually overlooked in packing joints to hold gas. The ordinary yarn contains a substantial amount of oil; and it is easy to make with it a joint that at first is gas-tight. Eventually, however, the oil is dissolved by the gas, and a large proportion of the joints begin to leak. If tarred yarn is used, the same condition prevails. Soap is commonly used as a filler for packing to hold oil or gas, and works very satisfactorily. If the yarn is properly driven, cast lead is most satisfactory as a gland to hold it in place. The lead should be soft; and free from tin or other metals that will harden it. It is frequently difficult to impress those responsible with the necessity of properly compressing the yarn. It is a great advantage in the use of lead wool that, provided too much is not put into the joint in the beginning, and it is properly consolidated, the yarn is necessarily compressed in the process of caulking. There are other advantages in using lead wool; but this particular one seems to outweigh all the others.

THE EVOLUTION OF THE GAS METER.

By A. T. Gilbert, Author of "Gas Meters."

There is no doubt that during the last decade the gas meter has been a source of worry to many gas managers. When one considers that from 2d. to 4d. per 1000 c.ft. sold can be charged to costs of repairs and upkeep of meters, and that the rentals do not cover depreciation, one realizes that there is some cause for worry. Yet it must also be understood that in many instances low meter-upkeep costs mean high leakage or unaccounted-for gas figures. Much of the trouble has been caused by the policy of many buyers purchasing the cheapest meter upon the list rather than the one best suited to district requirements. As a result, thousands of 2-light and 3-light meters crowd our districts, causing complaints (mainly due to pressure troubles) and higher leakage figures. To meet this difficulty, and as a compromise for what was really needed, the "Standard" meter sizes were introduced; and further to help matters, they were designed with unions to accommodate the existing pipe fittings.

These improvements, though a step in the right direction, did not meet the needs of the gas industry for a meter of small



Illustrating the Effect of Undersized Meters on Efficiency and Revenue.

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case dimensions of a high maximum capacity in cubic feet per hour for a minimum pressure drop, and last, but by no means least, at a 3-light price. This was the doctrine put forth by many of us years ago; and at least one meter maker made a 3-light cased meter to pass 60 c.ft. per hour, while others declared that "a quart could not be obtained from a pint pot." The writer also advocated many years ago that meters, like other gas plant, should be bought by capacity-per-hour rating, rather than by lights or other serial numbers which are no indication of their usefulness. It is therefore gratifying to learn that our largest undertaking is now buying meters by capacity-per-hour rating.

This fact has induced makers to endeavour to get the utmost capacity out of the available case space; and we find 2-light cases giving 50 c.ft., 3-light cases giving 150 c.ft., 90 c.ft., and 80 c.ft. per hour respectively; and 5-light cases giving 125 and up to 250 c.ft. per hour.

Now comes the buyer's dilemma. "The old meters," they say, "made 120 revolutions per hour (to deliver 18 c.ft.), the 'Standard' meters 240, and now these so-called high-capacity meters have 300 to 400 revolutions. Surely this is not a sound policy, &c." And they carry on buying 3-light or No. 2 meters, or perhaps purchase a sample high-capacity meter to try out for five years upon their district. Now if these objections could be removed, and high-capacity meters were universally adopted, the whole of the gas industry would benefit tremendously.

Before it can be decided whether a meter or any other piece of machinery will stand up to certain work and strain, there must be a thorough appreciation of its mechanical construction and operation. It would be helpful, therefore, to understand the meter first.

In broad outline, it comprises two flexible diaphragms capable of oscillating to and fro, connected through crank and link movement to two slide-valves provided with suitable ports and gas-ways through which the gas passes to and from the said diaphragms. If this cycle of operation is visualized, it must be readily understood that the valves should be timed accurately, and the link joints fit closely and work freely for the meter to function well. If all these members synchronize absolutely, it must be a practical impossibility for the meter to cease working and still pass gas,* or to work without passing gas. On the other hand, should any of the links break away from their moorings, or become so worn that the valve timing is upset (*and also providing that the valves and leathers are sound*), the meter would cease to pass gas, or, to use a district term, it would "shut out;" this is precisely what buyers are afraid will happen to the high-capacity meters "working at such a speed!"

The best answer to these objections is—Every one of the thousands of 3-light meters fixed and supplying (if they can) a cooker at (say) 100 c.ft. an hour is making 800 revolutions an hour, and is not reinforced in any way to stand up to the strain. Yet how many of these meters break down in the way just explained? How many are taken off for ceasing to pass gas? A very small percentage indeed. Many meters are exchanged for passing unregistered gas; but that is another complaint entirely.

The following figures are most conclusive:

Size.	Rate per Hour.	Cap. per Rev.	Revolutions Passing—		Rate Tested at per Hour.	Times Tested Rate per Hour when Passing 100 C.Ft. per Hour.
			100 C.Ft. per Hour.	80 C.Ft. per Hour.		
		Ft.			Ft.	Times.
3-light .	0·125	18	800	640	18	5·55
No. 1 .	0·125	30	800	640	30	3·33
5-light .	0·166	30	600	482	30	3 33
No. 2 .	0 166	40	600	482	40	2 5
10-light.	0·333	60	300	240	60	1·66
No. 3 .	0 25	60	400	320	60	1 66

High Capacity Meter Revolutions when Passing Same Amounts.

Size Case.	Badged Capacity per Hour.	Cap. per Rev.	Revolutions at 100 C.Ft. per Hour.	Revolutions at 80 C.Ft. per Hour.	Proportion of Tested Rate per Hour when Passing 100 C.Ft. per Hour.
3-light .	150	0·285	350	284	0·533
5-light .	250	0·333	300	240	0·32
5-light .	80	0·25	400	320	..
10-light .	125	0·33	300	240	0·64

These figures should be sufficient to prove that the objections of many buyers to high-capacity meters are entirely groundless, and—to use an old proverb—they (the buyers) strain at a gnat and swallow a camel.

Looking at the subject from the angle of mechanical efficiency, it is a well-known fact that efficiency is highest in engines when at or near full load. The gas meter is designed on very similar lines; and to a great extent the same conclusions can be drawn. Practically the only work the gas has to do in a well-constructed meter is to overcome the frictional resistance of a few small pivots and three stuffings, and last, but not by any means least, the resistance of the slide-valves. Here is the greatest resistance to be overcome; one has only to turn the "tangent" of any meter which has been upon the district a few weeks to realize that it takes a definite effort to revolve this member. It will also be apparent that the slower the tangent is moved, the greater the effort; but if the pace is

* The writer fully realizes the fact that meters do stop registering and still pass gas; but as this is the result of perforated diaphragms, it does not strictly come under failure through mechanical defects, which is here under consideration.

increased, the mechanical advantage increases. In the experience of the writer, meters have been opened for repairs, and upon examination the valves have been found to be so firmly fixed that a decided effort has to be made to move them.

If the high-capacity meters—and all other gas meters, for that matter—are well made, with all swivel-joints bushed and soldered joints socketed and strengthened, and also provided with continuous lubrication for the valves, &c., there is no reason at all why they should be less reliable than the older patterns—in fact, tests of the meters at various loads are remarkably accurate.

One word more with regard to the open top meter. This is now considered part of the design of the high-capacity meter, for the very sufficient reason that at least two changes of direction in the gas flow are cut out. There is no more danger in this than in the rest of the casing which contains gas; but, since the top of a meter is the top, and liable to damage before the other parts of the casing, it should be made of stronger material or stamped with extra corrugations, and it should be soldered more firmly on to the meter casing.

The cartoon-diagram illustrates the need for the high-capacity meter.

THE AGGLUTINATING VALUE OF COAL.

Experiments with the Barash Test.

Details of a method for determining the agglutinating power of coal were given by Mr. M. Barash, M.Sc. (Tech.), A.I.C., of the Research Department of West's Gas Improvement Company, Ltd., in his prize-winning paper in the Coke Competition—see "GAS JOURNAL" Coke Number, Nov. 9, 1925. The method is simple. A definite quantity of powdered coal (ground to pass through a 90-mesh I.M.M. sieve) is mixed with such quantity of standardized electrode carbon (graded 60-90 mesh) as will, on heating for a certain time at 800° C. in a modified Lessing furnace, give a powdery, non-coherent residue. The ratio of the coal in the electrode carbon is a measure of the agglutinating power of the particular coal.

Recently Mr. W. H. Fulweiler, Chemical Engineer to the U.G.I. Contracting Company, of Philadelphia, conducted a series of experiments with the Barash test for the agglutinating values of American coals. Though there were slight modifications, the procedure followed was very close indeed to that given by Mr. Barash in the Coke Number of the "JOURNAL."

Mr. Fulweiler found that attempts to standardize the electrode carbon by means of wheat starch were unsatisfactory. As the ratio of starch to electrode carbon was varied from 1 : 10 to 1 : 23, a regular decrease in the degree of agglutination of the carbon was observed. At a ratio of 1 : 23, the quantity of carbon coming from the furnace in the form of powder averaged about 90 p.ct. However, increase in the ratio from 1 : 23 to 1 : 30 had no visible effect in further decreasing the agglutination. Drying the starch for four hours at 110° C. had no appreciable effect on the results.

The following table contains the results obtained by Mr. Fulweiler on various gas coals:

Coal.	State.	Agglutinating Value. Coal : Carbon.
Elkhorn	Ky.	1 : 11
Caney Fork	"	1 : 11
Green River	"	1 : 11
Rhoda	Va.	1 : 12
Downard	Ky.	1 : 13
Royal Banner	Va.	1 : 13
Boone Chilton	W.Va.	1 : 14–15
Gano Moore	Ky.	1 : 14
Bewley Darst	"	1 : 15
Bridgeway	"	1 : 15
Blue Diamond	"	1 : 15
Tatlea	W.Va.	1 : 17
Westmoreland	Pa.	1 : 17
Keystone	"	1 : 17–18
Lincoln	W.Va.	1 : 18
Dundon	"	1 : 20
Federal	"	1 : 21
Montgomery	Ill.	1 : 22

A coking test* as described in Barash's paper was also performed on several of the coals in the preceding table. In general, Mr. Fulweiler found that those coals having an agglutinating value of 1 : 15 or less gave relatively dense cokes with little swelling. Those having a coking index above 1 : 15 usually gave a very porous coke accompanied by extensive swelling.

Samples of coal were interchanged between Mr. Barash and Mr. Fulweiler. The results obtained by the two experimenters were as follows:

Coal.	Agglutinating Value.	
	Barash.	U.G.I.
Arley	1 : 7	1 : 7
Mountain Mine	1 : 13	1 : 17

Mr. Fulweiler explains the lower result he obtained with the Mountain Mine coal as being due to the age of the samples. Experience has shown that the coking index falls off rapidly when the coal is exposed.

Coal.	Agglutinating Value.	
	U.G I.	Barash.
Elkhorn	1 : 11	1 : 11
Federal	1 : 21	1 : 21

In the above tests on the Elkhorn and Federal coals, both Mr. Fulweiler and Mr. Barash used U.G.I. electrode carbon. When Mr. Barash used his own carbon ("G. E. C. Witton"), he obtained the following values:

Elkhorn	1 : 12
Federal	1 : 23

When these figures are corrected by the factor $\frac{21}{23}$ for reducing the "G. E. C. Witton" carbon to the standard (*i.e.*, 1 : 21 against starch), the values become:

Elkhorn	1 : 11
Federal	1 : 21

The foregoing experiments point to the desirability of adopting either a standard inert material or a definite agglutinant for the standardization of the inert material, so that experimenters in different localities may obtain comparable results.

* For this, the modified Lessing apparatus is used.

INSTITUTE OF FUEL.

Programme of Annual Meeting.

Papers of far-reaching importance will be read and discussed at the annual meeting of the Institute of Fuel, to be held at the Institution of Electrical Engineers, Savoy Place, Victoria Embankment, W.C. 2, on Wednesday and Thursday, Nov. 23 and 24. In his Presidential Address, Sir Alfred Mond, Bart., M.P., proposes to give an outline of the work of the National Fuel and Power Committee since its formation. This will be the first public announcement of the stage reached by its efforts. On the evening of Nov. 23, the annual dinner of the Institute will be held at the Wharncliffe Rooms, Great Central Hotel, Marylebone, presided over by Sir Alfred Mond. The following is the complete programme for the meeting:

Presidential Address of Sir Alfred Mond, M.P.

"National Electricity Supply and Better Utilization of our Fuel Resources," by Sir Philip Dawson, M.P.

"The British Coking Industry and Some of Its Products," by R. Ray, B.Sc., A.I.C., M.I.Chem.E.

"Vertical Intermittent Chamber Ovens," by N. J. Bowater, O.B.E., B.Sc., A.M.I.C.E.

"Measurement of Steam Flow in Works Practice," by T. Nordenson and H. C. Armstrong.

"Conversion of Coal into Oil by the Bergius Process," by J. Ivon Graham and D. G. Skinner.

"Liquid Fuels," by Dr. A. E. Dunstan.

"Air Preheating," by P. H. N. Ulander.

"Carbonization of Coal by Internal Heating," by Prof. M. W. Travers, F.R.S.

"A Critical Study of the Determinations of the Heats of Formation of Steam and of Carbon Dioxide," by Prof. M. W. Travers, F.R.S.

"Practical Experiences of Steam Production at High Pressure," by John Anderson, of Milwaukee.

MIDLAND JUNIOR GAS ASSOCIATION.

There was a meeting of the Association in the Council House, Birmingham, on Thursday, Oct. 20.

Mr. C. F. TOOBY, the retiring President, occupied the chair at the outset, and acknowledged the generous assistance rendered to him during the year by the Council, and, in particular, by the Hon. Secretary, Mr. W. L. S. Spinks. With Mr. R. G. Marsh and Mr. W. J. Pickering, Mr. Spinks had also rendered useful service in connection with the Education Scheme. In asking Mr. H. R. Hems, of the Industrial Heating Section of the Birmingham Gas Department, to take the position of President, he bore testimony to his keen interest in the work of the Association. As Hon. Secretary, over a rather long period, he had ably carried out the duties of that office.

Mr. HEMS, on taking the chair, moved a vote of thanks to Mr. Tooby, who, he said, had shown business ability and done much to promote good fellowship among the members.

The resolution was seconded by Mr. F. CAUDWELL, Distribution Superintendent, Shrewsbury Gas Light Company (Senior Vice-President), and cordially approved.

Mr. TOOBY, in reply, congratulated the Association upon the excellent team spirit displayed during the year.

PRESIDENTIAL ADDRESS

of H. R. HEMS, of the Industrial Heating Section, Birmingham Gas Department.

Having expressed his thanks to the members of the Association for the honour they had conferred on him by electing him President, Mr. Hems asked for a whittling-away of the distinction between "works" and "distribution." Whichever branch you serve, he said, you have much to learn from the other, and you cannot afford to be away from a paper on the opposite subject. The works man should know more of the activities of the distribution man who disposes of his gas for him; and the distribution man has much to gain from a knowledge of "how it is made"—whether it is for answering questions put to him by consumers, or for the deeper knowledge which will show him that many works problems are distribution problems too.

EDUCATION SCHEME.

Your Association has taken an active part in the deliberations between the Junior Gas Associations and the Gas Education Committee of the Institution of Gas Engineers. At the commencement of these conferences your Council selected a special Sub-Committee, consisting of Messrs. C. F. Tooby, W. L. S. Spinks, W. J. Pickering, R. G. Marsh, and J. H. Gee, to watch the interests of the Association. Every member of the Association is indebted to this Committee for the time devoted to the subject and the thorough manner in which the various points were thrashed out.

One of the finest results of the deliberations between the Junior Gas Associations and the Institution of Gas Engineers was the suggestion for the formation of District Education Committees. These Committees have now been formed, and are hard at work. I can assure you that, as far as the Midland District Committee (of which I am a member) is concerned, we are anxious to fulfil the rôle of friend to any student or potential student.

In the question papers for the last (external) examinations under the Education Scheme, no question was asked for information on furnaces or suchlike apparatus. I think the teachers in gas supply should see that this most important branch of the industry is not left out of the student's work, as it is likely to be if no questions are asked by the Examiners.

THE INDUSTRIAL LOAD.

I believe I have the privilege of being the first President of this Association who has been associated particularly with that side of our distribution service devoted to the utilization and sale of gas to the industrial consumer—that is, the consumer using gas in large or small quantities in oven and muffle furnaces, drying stoves, and for food production on a large scale. For that reason, I propose to discuss the developments of various types of furnaces and apparatus, and the present position and future prospects of town gas for use in industry.

The field of uses to which town gas as a fuel may be applied seems almost illimitable. So much has been achieved that it is almost possible to say from actual experiment that whatever the heat application, gas will do it. The question for the gas supply undertaking and the consumer is whether it can be considered a commercial proposition.

Before the war, development work was difficult. Manufacturers and workmen were prejudiced against gas heating for works processes, and a large amount of individual experiments had to be carried out—often having to be completely repeated before another man requiring a similar process could be convinced of the efficacy of gas-heated appliances.

During the war years, the installation of gas furnaces and industrial apparatus proceeded at an unprecedented rate, and afterwards manufacturers realized the advantages which were to be gained by continuing the use of gas in peace-time production. To-day, a manufacturer "thinks" gas in considering fuel for any heat operation in his works. This, in itself, is a great achievement. The supplier should follow this up with all the service at his disposal.

COMPETITION.

Competition is keen. Solid fuel is comparatively cheap, and requires little skill in handling to obtain heat. Oil fuel is also cheap to-day, but it is questionable whether it will stay at the prices now ruling. Suppliers of oil are using every means of "getting in;" but it appears on high authority that oil supplies are by no means inexhaustible, and those in control have made little attempt at conservation.

Electrical energy has the advantage of controllability, and is particularly applicable to specialized operations and the attainment of extraordinarily high temperatures. It is applied in a highly efficient manner; but unless means are found whereby energy may be sold at very much reduced prices than at the moment appears likely—even taking into consideration the endeavours which are being made at present to provide current at lower rates—the gas industry has little to fear from electrical competition in the ordinary works heat processes.

I might almost say that in Birmingham we should welcome electrical development, when it is realized that the electricity industry in the City ranks among our largest consumers of gas for industrial processes. It would follow, therefore, that if the electricity industry develops, the gas consumed in the processes of manufacture of electrical requirements will automatically increase.

Undoubtedly gas holds the field as the practical ideal among fuels for the majority of metallurgical heat-treatment operations.

DESIRABILITY OF AN INDUSTRIAL LOAD.

No gas engineer or manager to-day would deny the advantages to be gained from the large consumptions which are to be obtained by the use of gas as a fuel for heat-treatment operations of all kinds in the factories situated within his area of gas supply. In the main, the demand for gas for these particular applications comes at times when demands for lighting and domestic needs are at their lowest. Thus the great advantage of an even load over a whole day's working is nearer fulfilment when an industrial load can be built-up and retained.

The possession of a number of industrial consumers certainly places obligations upon an undertaking to supply gas of uniform quality and at even pressure; but the increased revenue is surely worth this trouble, especially as the increased load in this direction will tend to the reduction of working costs, and should enable gas to be sold at cheaper rates for both power and domestic purposes.

RATES.

To obtain an industrial load, it is absolutely necessary for an undertaking to review carefully all costs of production, with a view to offering an inquiring manufacturer the lowest possible rates for the gas to be consumed.

I may be taken to task for talking of cheap B.Th.U.; but from my experience I am convinced that the use of gas in industry depends first and foremost on its being supplied at minimum prices. The greater the quantity taken, the lower should be the price charged.

I do not wish to be misunderstood. No one realizes more than I do that cheap gas alone will never create a large industrial load. Where high prices rule, certain consumptions are obtained automatically, which I should label "specials." These are the heat applications satisfactorily carried only by gaseous fuel, and are obtained with little or no effort on the part of the undertaking. When gas is in competition with other fuels, the question of price enters forcibly into the proposition; and if a representative is able to offer gas at a reasonable price, coupled with all the advantages which gas as a fuel can offer, he has a very favourable start towards obtaining the prospective consumption.

A reference to the following figures will illustrate the above, and show the need for us to make sure that the all-round efficiency of the apparatus we are offering is the highest possible, consistent with a reasonable capital outlay. It is also necessary to take into consideration, at their full value, all the other advantages to be obtained by the use of gas, to which I shall refer later.

Purchase of B.Th.U. for One Penny.

Fuel.	Basis Cost.	Calorific Value per Lb.	B.Th.U. in Fuel Received per 1d.
1—Coal	20s. per ton	12,000 B.Th.U.	112,000
2—Coke	29s. 6d. ,,	12,000 ,,	76,000
3—Oil	95s. ,,	18,500 ,,	36,300
4—Town gas . .	2s. 6d. per 1000 c.ft. (6·3d. per therm)	475 B.Th.U. per c.ft.	15,800
5—Electrical energy	1·1d. per KW.H.	3412 per KW.H.	3,100

One cannot help but be extremely interested in the various propositions for rate alterations which are being tried out in

various parts of the world. I am very much inclined to think that the system of making a fixed charge, based on the particular requirements of each consumer concerned, and charging a low rate for gas consumed would find many friends among both large and small manufacturers in this country—particularly the former—and should not be looked upon unfavourably by the gas undertaking if the load can be guaranteed.

I submit that it is unfair for a manufacturer to be debited with the costs of free fixing and maintenance of domestic apparatus, which in some undertakings account for an appreciable amount in the course of a year's working.

The whole question of rates and bases of charge is a complicated one; and this Association, I am sure, would welcome a discussion on the subject.

Definition of Industrial Load.

The definition of the industrial load is difficult. Various towns have their own ideas; and consumptions which may be looked upon as "industrial" in (say) a small town may not so be considered in the large manufacturing centres. It seems to be a question of the relative size or value of the consumption under consideration. It is also a fact that the term must be sufficiently flexible to enable it to embrace many special operations.

In many towns and cities, "industrial gas" has been sold at lower rates than domestic gas for use in furnaces, blow-pipes, drying stoves, &c., leaving any gas used for the production of foodstuffs on a large scale to be paid for at higher rates. I am glad to say that in the majority of cases the latter operations are now being looked upon as manufacturing processes, and charged for accordingly.

Historical.

Thomas Fletcher, of Warrington, was, I suppose, the first man to apply town gas to industrial purposes on anything approaching a commercial scale, and also to supply the necessary apparatus when he made blow-pipes, burners, and small furnaces for jewellers, dentists, and laboratory use, and proceeded to elaborate his designs for larger appliances.

For a number of years after Fletcher's pioneer efforts, several firms produced a range of small standard furnaces. Experiments were commenced by one or two makers of furnaces, and interest began to be shown by the gas supply undertakings; several organizing special departments. Among these were included one or two of the larger London Companies, Sheffield, Leeds, Glasgow, and Birmingham. The work at Birmingham is inseparable from the names of Dr. E. W. Smith and Dr. C. M. Walter, who were associated together in the earlier experiments which have led to the adoption of gas as a fuel in so many different processes, not only in Birmingham and district, but throughout the country and in many foreign parts. This early research work was essentially of a practical nature. I think I am right in saying that the majority of it was suggested by the needs of the manufacturers. Birmingham, of course, is a specially favoured city. Few processes of manufacture are not found within its boundaries.

Methods of Gas Utilization for Industrial Purposes.

Town gas is usually supplied to a manufacturer's premises at a pressure varying from 2 in. to 4 in. w.g.; this pressure varying at the discretion of the undertaking or according to situation. The simplest method of use is to apply it at this pressure to whatever process may be worked. I can give you no better example than the ordinary bunsen burner for this application, as the bunsen burner in some form or another is used in the majority of furnaces which come under the heading of "low pressure," or "natural-draught," types. With gas in this form, moderate temperatures are easily and quickly obtained by burners injecting part of the necessary air for combustion; combustion being completed by drawing on the surrounding air for the additional supply required. If the bunsen flame is applied to firebrick, the heat generated by the flame is stored, and heat is radiated on to any article the temperature of which we desire to raise. Temperatures up to 1000° C., or even slightly higher, may be obtained in this way. Higher temperatures than this can now be easily obtained with gas at ordinary town pressure, providing suitably designed furnaces are used, necessitating the preheating of the air required for combustion. Where it is necessary for high temperatures to be obtained rapidly or in small compass, one has to resort to the use of air under pressure, in order to effect the combustion of the gas at a high rate. Alternatively, it is possible to compress the gas itself, and deliver it from the compressor at pressures from about 100 in. to 300 in. w.g.

Gas needs for its combustion approximately four to five times its volume of air, according to its constituents; and, of course, the ideal of all furnace apparatus should be to have this volume of air available at the point of combustion. To-day, many machines have been designed which maintain a steady mixture of gas and air in predetermined amounts.

The following is a summary of the systems of gas heating available:

(1) Gas at ordinary town pressure, or "low pressure."
(2) High-pressure gas.
(3) Gas and air blast.
(4) Gas and air mixture systems.

The following are the general advantages to be obtained by the use of town gas as a fuel:

(1) General cleanliness of both furnaces and surroundings.
(2) Simplicity of control. Fuel handling is reduced to the turning of a tap, and almost fool-proof control is obtained. The gas-heated furnace lends itself more than any other form of furnace to temperature control and also automatic control.
(3) High speed of working. Heats can be obtained rapidly and retained with great ease.
(4) A high degree of cleanliness of the work produced. All manufacturers with whom I have had to deal speak highly of the quality of work which is produced in a gas furnace in comparison with (say) a solid fuel furnace. The absence of particles of dirt and grit in the working chamber of the furnace is mainly responsible for this, and the fact that oxidizing, neutral, or reducing atmospheres are easily obtainable as required.
(5) Saving of space by the elimination of fuel and ash storage.
(6) Saving of labour charges in the handling of solid fuel and ash.
(7) Absence of smoke resulting in greater comfort and greatly improved health of the workpeople employed.
(8) Simplicity of keeping manufacturing costs records, and the dissection of same, by separate metering of the gas consumed in different sections of the works.
(9) The service which the gas industry as a whole is prepared to offer to any consumer of gas for the improvement of any type of apparatus, leading to the reduction of working costs.

Oven and Muffle Furnaces.

Probably more time has been spent in the development of, and greater advance made in the design of, the oven and muffle types of furnace than in any other industrial apparatus. These furnaces are used in large numbers by manufacturers for the heat treatment of brass and steel in both large and small quantities, enamelling, the firing of porcelain, &c.

The earliest forms of these furnaces consisted of a brickwork lining externally bound with cast-iron plates. A portion of the bottom was removed to admit burners, and flue outlets were provided in the top. One or more bunsen burners were used, the flames from which were directed on to the under-part of a fireclay tray or muffle placed inside the lining. Control of primary air was obtained by adjustment at the injector; but any quantity of secondary air could be admitted.

Development of this furnace proceeded along the lines of closing the under-part of the furnace and obtaining complete control over the secondary air, and also the preheating of this air mainly by radiation from the under-part of the floor bed at the expense of the working hearth.

Attempts were then made to increase the efficiency of these furnaces by utilizing some of the waste heat contained in the flue gases, which must perforce leave the working hearth at the temperature of the hearth. Experiments on metal tubes and firebrick recuperators for preheating air supplies required for combustion have led to the designs of the highly efficient counter-current recuperator types of gas-heated furnaces we are able to offer industry to-day for long-period heating operations.

In addition to the attainment of high efficiencies with comparatively low-temperature operations, it is also possible easily to obtain very high temperatures over large areas by the use of complete regenerative systems.

It might be mentioned here that experiments have shown that for the majority of furnaces there is no advantage to be gained from preheating the gas itself if it is of the relatively high calorific value usually found with town gas supplies in this country.

It is possible that very soon we shall see developments taking place—particularly in the furnaces of the closed types, such as muffles—along the lines of single burner control, with exhaust fan arrangements drawing the gases, as required, through the combustion chambers and recuperative settings.

All the designs of furnaces I have mentioned have their uses and particular applications to-day. In these days of 8-hour working, it is unwise to recommend the furnace containing an excessive amount of firebrick work or an extensive recuperative setting with highly insulated casing. These details of design make a highly efficient furnace for continuous working. The older type of well-designed direct or semi-direct fired furnace, with reasonable insulation, should still be used for the shorter period working.

Insulating Material.

The question of the use of insulating material has formed no small part of the experimental work in connection with furnaces of the above types; and excellent grades of material are to be obtained in forms of powder, brick, or slab for use between the refractory wall and the outside plates of furnaces. This material prevents the loss of heat by radiation from the outside walls of the furnace, and must lead to economy in fuel, in addition to far more comfortable conditions for the workmen handling the furnace.

Again, it is possible to obtain special kinds of refractory material to-day which were not available a few years ago, by the use of which a conductivity equal to several times that of

ordinary firebrick is attained, and also a greatly increased strength. The use of such material enables a speedier heating-up of the furnace and heat penetration of the load, and also enables floor tiles of thinner section to be used without risk—all factors which lead to economy of gas consumption and reduction of maintenance costs, as the life of this material covers many times that of firebrick. Material of this kind is, of course, expensive in first cost; but it pays for itself in continuity of output and the cutting-out of the inconvenience and cost of frequent repairs.

Pyrometer control is, of course, a *sine qua non* with gas furnaces. Apparatus for automatic control is available, but I should like to suggest that there is room here for further research. An instrument capable of standing workshop usage at a reasonable price is badly needed, and I predict a large sale for the firm producing a satisfactory appliance of this kind.

Metal Melting.

In the melting of metals, a great amount of work has been carried out by many investigators, and full data are not difficult to obtain from several sources regarding the melting of most non-ferrous metals and alloys. Town gas has every advantage, with the exception of price, over other fuels; and to obtain the general brass and gunmetal foundry work, gas needs to be sold at much lower prices than its present rates. This does not mean to say that no gas is being used for this purpose. Where a manufacturer is sufficiently keen to weigh up all the extra savings to be obtained by its use, gas still holds the field. An installation came to my notice only a few weeks ago which has been continually in commission since 1912.

For special high-temperature melting work, gas is used in the majority of cases, owing to its controllability and its independence of flue pulls, which are likely to be affected by weather and wind conditions. The Birmingham University and the Birmingham Municipal Technical School each have special gas furnaces for melting alloys having high melting-points.

For aluminium melting, town gas has proved to be the ideal fuel; and large quantities of gas are taken from many undertakings throughout the country for the melting of aluminium alloys for the production of sand and die castings used in the manufacture of motor-car parts, domestic articles, and the thousand-and-one other articles made of aluminium.

You may be interested to know that we have just regained the gas consumption, amounting to nearly 10 million c.ft. per quarter, for a large aluminium foundry in Birmingham, which we lost some time ago to oil. This again proves that fuel cost is not the only cost to be considered.

Gas is also used in large quantities for the lower melting-point metals, such as lead, tin, solder, &c.

Special Applications.

The oven and muffle furnaces referred to have covered the types of furnaces used in the motor-car, general engineering, and brass trades, for such processes as case-hardening, reheating, and annealing; in the enamelling industry for the firing of enamel plates; and for the firing of porcelain at high temperatures.

The melting furnaces cover the jewellers' needs, and the melting of brass, gunmetal, nickel, and other alloys, together with aluminium and solder.

We should be very surprised at the figure revealed, if it were possible to dissect the number of drying stoves and the consumption of gas used for the drying of japans and varnishes on such manufactured articles as bicycles, lamps, &c., and also the number of gas-heated tanks for solution heating in cleaning and plating processes, installed in manufacturing centres.

In the glass industry, gas-heated lehrs for annealing glassware, and gloryholes for finishing after blowing operations, are extensively used.

The manufacture of articles in tinplate calls for the use of many thousands of gas-heated soldering-iron heating stoves. A great amount of attention has been paid to this seemingly small unit; and by the introduction of a firebrick lining, an all-round reduction of combustion space, and also improved burners of both low and high pressure types, a far more economical stove is available than that which the industry had to offer a few years ago.

In our Darlaston area, gas is extensively used for the production of nuts and bolts in high-temperature forging furnaces. Oil is the most formidable competitor, but there are signs that gas is being considered more seriously for these operations, in spite of its higher cost.

The manufacture of brass and steel tubes demands furnaces for annealing operations; and many manufacturers making brazed tubes use gas furnaces for the brazing operations on tubes up to 4 in. and 5 in. in diameter, brass or copper.

The jewellers were almost the first craftsmen to use gas industrially; and if Birmingham is an example, they still continue to employ great quantities for blow-pipe operations, and muffles for gold and silver annealing, enamelling, &c.

Varnish and gum manufacturers are now turning to town gas for their boiling operations. Several successful all-gas installations exist in London. We completed a very fine installation a short time ago; and there are more to come.

There is a continuous increase in the amount of gas used in food production on a large scale. The bakers are slowly but surely turning from their old methods, by the introduction of simplified and fool-proof apparatus. Biscuit baking in the larger factories is almost exclusively carried out in the now well-known types of high-pressure gas-heated conveyor ovens.

Sugar boiling and sweet making are now being carried out in a clean and wholesome manner in gas stoves, which have replaced solid fuel stoves with their accompanying dirt and dust and general uncleanliness. One installation of gas-heated stoves at the works of Messrs. Cadbury Brothers, Ltd., in which I have been specially interested, has been finished in a coloured glazed tile setting, and even the necessary fan and piping system have been enamelled.

Water heating, whether for manufacturing processes, domestic heating, or for the central heating of schools and of works premises, offers a wonderful field for gas. Recently I had the opportunity of inspecting some very fine boiler installations working on low-pressure gas, with exhaust fan and automatic control, which, from practical figures, show a saving in every direction over the solid fuel boiler. This is surely a field which every undertaking should investigate immediately, and which, incidentally, America has developed to advantage.

For steam raising, too, gas has several excellent and efficient types of boiler to offer a manufacturer. One gas-heated boiler in Birmingham, doing exactly the same work as a similar size of solid fuel boiler in Coventry, costs less than the latter to run.

In the heating of tanks, internal burners are now being applied efficiently; and we may look before long for interesting developments of the submerged flame burners..

Furnace and Apparatus Manufacturer.

The gas industry is fortunate in having a number of excellent manufacturers of industrial gas appliances, many of them having made a special study of the needs of manufacturers by carrying out research work into the application of gas to their special processes. Another pleasing feature is that the industry has practically no need to purchase outside this country, as furnaces and apparatus of the most efficient types are produced in Great Britain.

I feel that any undertaking endeavouring to obtain industrial consumption should co-operate to the fullest extent with the apparatus manufacturers, with a view to obtaining the best they can offer. In Birmingham we are always glad to hear of new developments, and endeavour to advise the best apparatus from the lists of all the manufacturers. Of course the price question is, unfortunately, so often the deciding factor that it is not always possible to have one's own way with an installation.

In conversation recently, an American, over here studying the industrial gas question, stated that he felt there was a great need in his country for a manufacturer of gas furnaces and industrial apparatus solely devoted to the gas interests. So many furnace manufacturers in America cater for all forms of fuel that often it is difficult to obtain the correct information and advice needed. I am convinced that a similar need exists in our own country. Probably in Birmingham we are able to hold our own for gas; but I have heard of several cases elsewhere in which the gas proposition has not had its proper chance of consideration because the various manufacturers have put forward their own views on other fuels.

Service.

The basis of development and retention of an industrial load, as indeed of other loads, is "Service." Probably in industrial matters the word has a special meaning. I look upon it as "living with" one's consumer. No industrial consumption should be obtained under false pretences. If you are approached with regard to gas for a certain heat application in a works in your area, however keen you are to obtain the consumption, calculate what it is going to mean in other forms of fuel as well as gas—allotting particularly all the advantages and disadvantages to each of them. Advise the manufacturer from the results of those deliberations. If you gain the desired gas consumption, you will have obtained something more lasting than would have been the case if you had simply pushed "gas" without consideration of competitors.

Once a manufacturer has decided on the use of gas as a fuel, an undertaking should promptly supply adequate services and meter, together with advice regarding details of supply piping necessary to individual pieces of apparatus, whether or not the actual work is carried out by the workmen of the undertaking.

With regard to the gas-consuming appliance itself, if the undertaking has a man or men capable of advising, the matter is easy. The difficulty arises in the case of undertakings who are not in a position to retain specialists in these matters. For these, of course, there are one or two alternatives. One or more furnace apparatus manufacturers can be approached, and their quotations and recommendations intelligently examined before placing the matter before the potential consumer. I strongly deprecate the practice of several undertakings, who place themselves completely in the hands of one manufacturer, or even, where they have powers, only supply apparatus of their own design and manufacture.

The proposition can be placed before representatives of an undertaking known to have information on the application under consideration, or the proposition can be referred to the

service organization of the industry—the British Commercial Gas Association, who have probably better facilities than anyone for knowing where to obtain special information.

INDUSTRIAL CIRCLES.

In spite of what has been achieved by the "B.C.G.A." in connection with industrial matters—the Industrial Circle meetings have undoubtedly done excellent work in disseminating information among those interested—I feel that there is a very great need for more intensive effort in this direction. Except for the few undertakings which set the ball rolling, and are still reaping the benefit, there seems very little doing.

One would think that with our efforts in Birmingham extending over so many years, we had "gasified" every factory; but we are continually obtaining new consumptions. I am sure that it is only lack of effort on the part of many undertakings that heat applications which are best and most economically carried out by town gas are being effected by other forms of fuel.

Coupled with the lack of effort is the pardonable lack of information and knowledge of these works processes; and it is in this connection that I think one of the authoritative associations like the Institution of Gas Engineers, the National Gas Council, or the "B.C.G.A." should provide a central source of information and practical advice, even to the extent of fitting-up workshops and laboratories, and providing one or more experts who could be available for visits to provincial undertakings when the latter are negotiating for industrial consumption.

It is not good that these things be left entirely in the hands of the manufacturer of appliances, who have to make their profit solely on the sale, and have the least to gain from the installation of the apparatus. The undertaking and prospective consumer are entitled to the best unbiased information which can be obtained on the subject.

METHOD ADOPTED IN BIRMINGHAM.

After obtaining an inquiry, by direct application from a manufacturer, through a representative of another section of the Department, or through an exhibition, the objective of the Industrial Department at Birmingham is to visit the premises with a view to ascertaining requirements. In all probability an invitation is extended to visit either the demonstration room or the heat-treatment section. In these preliminary negotiations I need hardly add that courtesy and an infinite amount of tact are necessary in putting one's case before the inquirer. The matter may now proceed to a test, advice, and quotation for the particular furnace needed. If it is absolutely necessary, a special furnace is designed and erected.

REPAIRS.

A form of "after-sales" service which we have built up to a very efficient state is the inspection and repair of any make of gas-heated furnace or industrial appliance. This service is greatly appreciated by many of our consumers, large and small; and I am sure that it assists us in the maintenance of our industrial load. Though we have no definite scheme of maintenance in this connection, we virtually maintain, at the consumer's request, a number of our furnace installations.

METERS.

In considering the installation of gas furnace plant in a manufacturer's premises, I often recommend the fixing of more meters than the one main meter at the entrance to the works. The value of separate meter readings covering various sections of a works, or (say) one or two specially large furnaces, cannot be over-estimated from the consumer's point of view.

INDUSTRIAL SALESMEN.

The type of man needed to handle industrial sales should be a combination of salesman, engineer, and research chemist. Much has been written on the question of whether an industrial man should be engineer, metallurgist, or salesman. The proposition is developing now to such an extent that there is probably room for each of them as specialists in their own lines, with someone to bring their ideas together to place as a whole before the consumer.

The Birmingham Gas Department, in addition to special services to their prospective and actual industrial gas consumers, have for some years placed at the disposal of manufacturers a complete suite of laboratories, now known as the Industrial Research Laboratories, of which the Industrial Heating Section forms a part. These laboratories consist of gas furnace, demonstration, and experimental rooms, physical, metallurgical, and chemical laboratories at the Council House, and a special heat-treatment department at the Windsor Street Gas-Works. Work of investigation is undertaken either with or without the possibility of gas consumption being obtained. In the latter eventuality, a charge is made for the work carried out.

The heat-treatment section is of particular value to the Department, inasmuch as in the course of a year's working many tons of articles in course of manufacture are heat-treated on a commercial basis, and figures of costs are easily obtainable, as all this work is carried out in gas-heated furnaces of various types and manufacture.

I am convinced that to build-up an industrial consumption on the basis of co-operation between supplier, consumer, and apparatus manufacturer—which method Birmingham has adopted probably to a greater degree than any other city—is the plan on which other undertakings supplying manufacturing centres have to work. Probably we may look forward to the not far distant future when a somewhat similar organization will be available for the whole industry.

The records of gas consumption obviously show the benefit of the service to the Department.

Year Ended March 31.	Total Gas Sold.	Total for Industrial. (Separate from Power.)	Industrial, P.Ct. of Total.
1911	7,693,899,300	389,511,000	5·06
1914	9 551,783,300	793,840,400	8·31
1918	12,006,496,700	2,680,489,200	22·33
1922	10,264,218,300	1,345,637,300	13·11
1925	12,659,612,900	2,309,976,800	18·25
1927	13,338,242,400	2,605,287,200	19·53
1927 (six months ended September) . . .	5,757,855,800	1,348,715,700	23·42

In addition to the consumption gained, manufacturers send their difficulties along to the Department, and a possibility of a change-over to other forms of fuel is heard of before it actually takes place, and therefore an opportunity is given to carry out experiments with a view to preventing the loss of consumption.

AN INDUSTRIAL SURVEY.

Over an extended period in a large city, it is possible for a large amount of apparatus to be installed which may not be brought to the notice of the gas undertaking. Realizing this and the necessity for keeping in touch with past and present customers, we decided to make a survey of all industrial consumers within our area.

A card system was arranged of all industrial meters, and it was found that only about 20 p.ct. of the total number of consumers had been in direct communication with the Industrial Section at any time. A special representative was appointed to visit these consumers and inspect all apparatus installed, tactfully advising improvements where these could be suggested. I am glad to say that these visits have been much appreciated by many of our consumers, and are enabling us to obtain records of all types of apparatus used in Birmingham. These records have already suggested to us lines which useful experimental work might take.

To give an instance, we have been surprised at the large number of tanks which are used in various works for the heating of water and solutions, principally for plating operations. The majority have been found to be fitted with inefficient burners, with little or no attempt at heat conservation by the use of either insulated stands or brick settings; and complaints of heavy gas consumption have been made by the consumer. We have suggested improved types of burners and the use of insulated cases, and have thus been able to cut out night consumptions.

With regard to this type of apparatus I am also surprised at the number of manufacturers who fit totally inadequate and unsuitable burners. They seem afraid to fix burners taking a large gas consumption. It is much more economical to fit under tanks of this kind burners consuming gas at a rate which will bring the solution to be heated to its required temperature in (say) one or two hours, than to have small-consumption burners which take hours to raise the contents to the desired temperature, and have to be kept going all night to maintain this temperature ready for work first thing in the morning. Savings in gas consumption and time of heating as great as 33⅓ p.ct. have been proved possible by the use of correctly-designed burners and insulated settings in the case of gas-heated water and solution tanks.

In addition we have been able to replace a considerable amount of obsolete apparatus with more up-to-date designs, and also to obtain a number of new consumptions.

I am sure that this survey, when completed, will have been well worth undertaking, and will probably lead to a more ambitious scheme extending into a survey of possible uses of gas in works not at present using it.

Mr. F. C. BRIGGS, proposing a vote of thanks to Mr. Hems for his address, said it was exhaustive and literary, and set forth an ideal which those engaged in smaller undertakings might strive to reach. He commented upon the advance made recently in the introduction of the recuperative furnace, and insisted that a closer co-operation between works and districts was of real value. He did not think they had yet come to the end of progress in industrial furnaces, and he felt that they would, in due course, attain temperatures as high as were needed, without any high-pressure air or gas. Part of the difficulties yet to be solved had relation to refractory materials; but substantial progress was being made in this regard. As to the Education Scheme, there seemed, at times, to be

evidence of a feeling on the junior side that the seniors were not as sympathetic as they might be. Some juniors conceived the idea, apparently, that the examinations were made too stiff; but obviously educational and technical standards could not be whittled-down. He assured the juniors that the senior engineers were thoroughly sympathetic in connection with the Education Scheme. Regarding the industrial position, experience showed that the soundest undertaking was that which had a well-balanced load; and it was essential that close attention should be paid to this aspect. As to service, the great difficulty was that one could not afford, in small companies, to run a special department. He was convinced, however, that consumption only required looking for to be secured.

The resolution was seconded by Mr. W. Macnaughton (Wolverhampton), and unanimously approved.

After refreshments, the members paid a visit to the Industrial Heating Section of the Birmingham Gas Department.

Aviation Signs on Gasholders.

With a view to assisting aviators, several gas companies in the United States have painted suitable markings on the tops of gasholders—usually a white arrow pointing the direction to the nearest landing field, and the name of the town in black letters. As far as can be ascertained, much goodwill is being created for the companies in performing this act of service. It not only calls the attention of the aviators and the public to the gasholders, but also causes people to realize that their utility undertaking is anxious to serve in every possible way. A striking example is a 3 million c.ft. waterless holder at Detroit, which, naturally conspicuous because of its dimensions, has been rendered more so by painting it a vivid colour, and by the placing of directing signs on the top. This use, says Mr. C. W. Bennett (Vice-President of the Gas Company), in a communication reproduced in the "American Gas Association Monthly," was suggested by the experience of flyers while the holder was under construction in 1925. They observed that, in its shop's coat of red lead paint, it was the most strikingly visible object in the vicinity, and was of great assistance to them in locating the landing field. The Detroit City Gas Company arranged to retain its value for the purpose by making the final coat of paint an orange red, in place of the grey shades that had been contemplated. In addition to this, a broad, white arrow was painted across the top, pointing directly to the landing field. The holder is 145 ft. in diameter and 205 ft. high; and, with its bright colour and white arrow, it constitutes an excellent guide. At Des Moines, there is painted on the crown of a holder, as a guide for aeroplanes passing over the city, an arrow 130 ft. long. The head is 35 ft. wide, and the body 15 ft. wide.

Hobbs' Thermal Heating System.

This is the title which has been given to a novel system of heating for which a patent has been taken out by Mr. H. Hobbs Wilson, of 268, High Road, Wood Green, London, N., who showed it in action on his stand at the recent North London Exhibition in the Alexandra Palace. The idea is to utilize the surplus heat from a gas fire to raise the temperature of water, which afterwards passes into a panel that may be fitted in any other room in the house. When not required for this purpose, the same heat can be used for providing a domestic hot water supply. It is understood that careful tests of the invention are to be carried out; and when the results of these are available, it may be possible to make further reference to the invention.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

Low-Temperature Gas for Town Supply.

Sir,—With regard to the "K.S.G." contract, I have read with great interest the comments in your Editorial in the "Journal" last week, which are justified, as the description was perhaps not quite clear on one or two points.

The "K.S.G." plant will handle normally 640 tons of bituminous coal per 24 hours in the eight retorts, and the yield from this is given as 2,500,000 to 3,000,000 c.ft.—that is an average of about 3900 to 4700 c.ft. of rich gas per ton. Of course, in the first place it will be understood that the yield of gas varies with the quality of the coal, and may be anything from (say) 2500 to 5500 c.ft. per ton.

It is certainly a mistake in the description to state that this will be diluted with carburetted water gas. Of course, what will be done will be to dilute this rich gas with blue water gas. The point is that from this plant there is required a minimum output of 3 million c.ft. of town gas of 530 B.Th.U. per c.ft., with a normal operating duty of 4 million c.ft. at 530 B.Th.U. Accordingly, the yield of rich gas (800 B.Th.U. per c.ft.) obtained—possibly between 2 million and 3 million c.ft. per 24 hours, from most coals—will be mixed with the blue water gas to give 4 million c.ft. of mixed town gas at 530 B.Th.U.

The main point, however, in relation to the gas industry is that this installation is to include water gas plant of the latest design in two sections, capable of giving 3 million c.ft. of carburetted water gas of 530 B.Th.U. per c.ft. Normally this plant will be operated at much less than its rated output on blue water gas only, for mixing with the rich low-temperature gas. If, however, there is any breakdown or interference with the normal operation of the low-temperature plant, then it will be immediately switched round to carburetted water gas, always giving a minimum of 3 million c.ft. of town gas per 24 hours. That is to say, the continuity of town gas supply is assured, and in this way one of the old objections to low-temperature carbonization has been eliminated. As stated in your Editorial, there is evidently a very good market in the locality for the smokeless fuel, presumably in competition with anthracite, while, as usual, the yield of low-temperature tar varies with the quality of the coal.

Our Special Correspondent.

Oct. 22, 1927.

Wrought-Iron Tubes.

Sir,—In view of representations which were made to the Wrought-Iron Tubing Committee at their recent meeting, it is desirable that attention should be called to the great importance, when ordering or purchasing tubes and fittings, of specifying that they must be produced in conformity with the regulations contained in the Specification of the Institution of Gas Engineers.

If this is done, tubes and fittings produced from genuine wrought-iron strip of British manufacture, and marked "I.G.E.," will be obtained. Such wrought-iron strip is less corrosive than steel or the material sometimes used, and is thus more durable.

Clause 1 of the Specification relating to tubes and fittings reads:

> *Material.*—Tubes shall be made from puddled iron supplied by one of the strip manufacturers on the scheduled list approved by the Institution of Gas Engineers, and it shall be one of the conditions precedent to a firm being placed upon this list that the firm agrees to supply tube manufacturers purchasing strip from them with a certificate to the effect that the whole of the material represented by each invoice conforms with the clauses of the Specification of Wrought-Iron Gas Tube Strip drawn up by the Institution of Gas Engineers. Such certificate shall be shown by the tube manufacturer to the buyer of tubes, on application by the latter.

A copy of the Institution's Specification for (I.) Wrought-Iron Gas, Water, and Steam Tube Strip; and for (II.) Wrought-Iron Gas, Water, and Steam Qualities Tubes and Fittings was issued to members, and was published in the "Journal" for Feb. 16 last.

The firms who have so far been placed on the scheduled list of wrought-iron tube strip manufacturers are as follows:

John Bagnall & Sons, Ltd., Wednesbury, South Staffordshire.
John Bradley & Co. (Stourbridge), Ltd., Stourbridge Iron Works, Stourbridge.
Butterley Co., Ltd., Butterley Iron Works, Derby.
David Colville & Sons, Ltd., 195, West George Street, Glasgow.
Etna Iron and Steel Company, Ltd., Etna Iron and Steel Works, Motherwell, N.B.
George Gadd & Co., Ltd., Church Lane Iron Works, Tipton.
Hart's Hill Iron Company, Ltd., Hart's Hill Ironworks, Brierley Hill.
Robert Heath and Low Moor, Ltd., Biddulph Valley Coal and Iron Works, Stoke-on-Trent, Staffordshire.
N. Hingley & Sons, Ltd., Netherton Iron Works, Dudley.
Johnson's Iron and Steel Company, Ltd., Hall End Iron Works, West Bromwich.
Knutton Iron and Steel Company, Chesterton, Stoke-on-Trent.
William Martin, Sons, and Co., Dundyvan Iron and Steel Works, Coatbridge.
Midland Iron Company, Ltd., Midland Iron Works, Rotherham.
Pather Iron and Steel Company, Ltd., Pather Iron and Steel Works, Wishaw, N.B.
Pearson and Knowles Coal and Iron Company, Ltd., Warrington.
Scottish Iron and Steel Company, Ltd., 53, Bothwell Street, Glasgow, C. 2.
Shropshire Iron Company, Ltd., Hadley, near Wellington, Salop.
Thomas Walmsley & Sons, Atlas Forge, Bolton.

May I, on behalf of the Committee, thank you in anticipation for your courtesy in giving space to this communication.

Walter T. Dunn, Secretary,
Institution of Gas Engineers.

28, *Grosvenor Gardens,*
Westminster, S.W. 1,
Oct. 22, 1927.

REGISTER OF PATENTS.

Distillation of Carbonaceous Materials.—No. 276,407.

NIELSEN, H., of Muswell Hill, and LAING, B., of Victoria Street, S.W. 1.

No. 6337; March 6, 1926.

This invention for distilling carbonaceous materials by internal heating is of the kind in which the material is first subjected to distillation at low or moderate temperatures, so as to drive off a portion of the volatile matter, and thereafter to high-temperature distillation so as to drive off a further quantity of volatiles.

According to the invention the same distilling medium—inert gas, such as combustion gases, or water or producer gas—is employed for both the low and the high temperature stages, and the temperature zones throughout the length of the apparatus are graduated so that the oils are distilled off by direct contact with the heating medium at the temperatures at which they volatilize, and are withdrawn in uniflow with the heating medium either at one end or at different points at temperatures at which no cracking can occur.

To this end, the inert gas, after being superheated if necessary, is passed through an apparatus, such as a rotary retort or a two-stage retort, in direct contact with, and in contra-flow to, the raw carbonaceous materials; and its sensible heat is employed first to distil off the volatilized and condensable oils and thereafter, as a continuous step in the same process, to drive off the so-called permanent gases. The inert gas is preferably so controlled as to lower the vapour pressure of the volatilizable oils as much as possible.

The patentees state that it is essential, in order to obtain a free-burning solid residue, that the volatilizable oils should be withdrawn from the retort without cracking; otherwise, graphitic carbon is deposited on the solid material which coats the cells and cell walls with a highly impervious film which is difficult to oxidize, and which reduces to a marked degree the readiness to combustibility as well as to reactivity of the resultant fuel. It is also essential that the oil-yielding and volatilizable constituents should be expelled from the solid material at as low a temperature as possible—say, at temperatures ranging from 185° to 580° C.—and the permanent gases thereafter at from 580° up to approximately 1200° C.

Such a temperature range may be maintained in a single retort, or two shorter retorts may be employed; and the inert gas may be by-passed as convenient for superheating and readmission.

The patentees have found that in this way temperatures up to and exceeding 1100° C. may be employed after the condensable oils have been driven off so as to drive off the residual volatiles, and reduce the volatile matter in the solid residue to 1 to 4 p.ct.; this result being obtained without in any way interfering with the easy ignitibility, combustibility, or reactivity of the solid fuel. The solid residue can be burnt in open domestic grates, and is claimed to be more readily ignitible than ordinary semi-coke and far more readily combustible than ordinary gas coke or coke oven coke. This property appears to be due to the fact that the original cell structure of the raw material is left intact, and the depositing of an inert carbon film on the residual fuel is avoided, while the thinness of the cell walls is maintained so that a very large superficial surface is made available for attack by oxygen either combined or in a free state.

After referring to the fact that the plastic state in carbonization may be avoided by subjecting a coal to a preliminary heat treatment, the patentees give the results of treating a bituminous coal, with a volatile content of 30 p.ct., according to the invention.

The first stage yielded, per ton, 20 gallons of oil, 15 gallons of ammoniacal liquor, and 2500 c.ft. of gas. Volatile matter to the extent of 10 p.ct. remained: and in the second stage a further 5000 c.ft. of gas—mainly hydrogen, methane, and carbon monoxide—was obtained. There was a residue of 1·5 p.ct. of volatiles; and the solid residue was ignitible with paper in an open grate.

The primary oil contained a large percentage of the more valuable high-boiling fractions rich in hydrogen—that is to say, a lubricating oil which at normal temperatures (12° to 18° C.) has a so-called static coefficient of friction from 0·1 up to 0·185.

The features of the invention are further discussed in the specification, and are covered by 15 claims.

Water Gas Manufacture.—No. 276,753.

HUMPHREYS & GLASGOW, LTD., and STELFOX, J. C., both of Victoria Street, S.W. 1.

No. 14,200; June 4, 1926.

Referring to complete gasification in tri-partite retort plant, the patentees point out that the fuel charged into the generator is carbonized by the hot gases flowing through it more rapidly near the wall of the generator, owing to the great permeability of the mass of fuel near the wall and the radiation and conduction of heat from the wall; and there is a tendency in generators of large diameter for the central part or core of the mass of coal in the upper part of the generator to be imperfectly carbonized. If this core extends into the lower part of the generator, there is loss of efficiency and capacity.

The object of this invention is to replace this central core of coal by a permanent central core which at the same time increases the wall surface in contact with the coal being carbonized, so that all portions of the coal in the upper part of the generator are maintained within the desired distance from a wall surface and consequently are more equally permeable to the hot gases. This permanent core is suspended from above, and may be of any suitable cross-sectional shape and parallel-sided or tapered or otherwise; the arrangement being such that the mass of coal during carbonization is not sub-divided in compartments, but is maintained in an unbroken annular or like mass. Thereby uneven carbonization is minimized, the regular downward flow of the carbonizing fuel is unobstructed, and the risk of a core of badly carbonized coal descending into the lower part of the generator is eliminated.

Various constructions may be adopted; but it is preferred to attach to the top plate of the generator a solid or hollow body or tube which extends towards or into the water-gas zone. The top of this body may be either above or below the surface of the fuel, and may be capped by a cone-like top or may project through the top plate. It may be adapted to be adjusted or withdrawn. It may conveniently be formed of heat-resisting metal or alloy, or may be of refractory material and reinforced or supported by metal. Where necessary it may be supported or stayed at its lower end.

Suitable charging arrangements are provided to enable the fuel to be evenly distributed above or around the core.

Valve Mechanism.—No. 276,754.

HUMPHREYS & GLASGOW, LTD., and STELFOX, J. C., both of Victoria Street, S.W. 1.

No. 14,201; June 4, 1926.

The object of this invention is to enable large and heavy valves to be operated by hand without the employment of gear which would render the movements slow.

It is usual to counterbalance large valves to facilitate their movement by hand; but when the valves are seated, the counterweights tend to reduce the pressure of the valves against their seats. This is especially the case with valves of the single or double gate type, as their tight seating is not dependent on the weight of the discs, but upon the weight of the attachments acting on the wedges.

According to the invention, counterbalanced hand-operating mechanism is so constructed as to provide for continued movement of the counterweight after the valve has come to rest in its closed position, and consequent stressing of a spring interposed between it and the valve, and for locking the mechanism in this position. Release thereof permits the spring to recoil and the counterweight to move before the valve is operated.

The mechanism is fully described and illustrated in the specification.

Retort Doors.—No. 277,078.

LOW TEMPERATURE CARBONISATION, LTD., of London Wall Buildings, E.C. 2, and PARKER, J. F., of Codsall.

No. 14,298; June 7, 1926.

This invention relates to doors for closing the lower ends of retorts used in the manufacture of coal gas, &c., and has for its object to provide a simple construction of door whereby effective closure may be secured and which is adapted to be readily dismantled for inspection or repair.

The principal claim is for "doors for closing retorts and the like wherein the door is hinged in mountings such that when in the closed position the door is free of the mountings, and is maintained upon the seat by pressure applied at one or more positions in the middle of the door or at a position or positions between the middle and the edges of the door." The pressure is applied by the member to which the door is hinged; and this member is pivoted in open bearings.

The design is described fully with drawings.

Off-take Pipes.—No. 277,079.

LOW TEMPERATURE CARBONISATION, LTD., of London Wall Buildings, E.C. 2, and PARKER, C. H., of Codsall.

No. 14,300; June 7, 1926.

This invention has among its objects to avoid the deposit and accumulation of pitch in the vapour outlet pipe of a vertical or inclined retort, and in a simple way to accommodate the expansion and contraction of the vapour outlet pipe.

Accordingly, the vapour outlet pipe between the retort and the hydraulic main is provided with a surrounding jacket through which water or other cooling medium is circulated in order to induce a substantial amount of condensation; and this part of the pipe is inclined downwards towards the hydraulic main, whereby a continuous flow of liquid tarry matter into the hydraulic is ensured, and the deposit and accumulation of pitch are minimized.

Further, a seal is provided in the pipe at a position above the hydraulic main. For this purpose the length of pipe vertically disposed and passing into the hydraulic main is formed at its upper part with a surrounding annular space within which extends the downward part of the vapour outlet pipe by which a liquid seal is provided. By such means freedom of expansion and contraction is assured.

Discharging Retorts.—No. 277,080.

LOW TEMPERATURE CARBONISATION, LTD., of London Wall Buildings, E.C. 2, and PARKER, C. H., of Codsall.

No. 14,301; June 7, 1926.

This invention is specially applicable to vertical retorts; the patentees claiming: Means for discharging retorts comprising, in combination, a skip or tub adapted for the reception of coke or residue on the downward discharge from retorts, provided at the upper end only with an annular cavity or channel to contain a sealing liquid or substance, and means, such as an extension from the retort or retorts

or from an intermediate discharging chamber or the equivalent, provided beneath the retorts, adapted to make with the annular cavity or channel aforesaid a gas-tight seal on a short movement of the skip or tub in the direction of the retort extension or the equivalent.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Oct. 12.]

Nos. 25,995—26,723.

Francis, W. R.—"Ovens of gas cookers." No. 26,022.
Gas Light and Coke Company.—"Carbonization of coal." No. 26,495.
General Gas Appliances, Ltd.—See Francis, W. R. No. 26,022.
Glover & Co., Ltd., G.—"Prepayment gas meters." No. 26,660.
Hanson, A. F. E.—"Automatic prepayment meters." No. 26,721.
Hollings, H.—See Gas Light and Coke Company. No. 26,495.
Hoskins, S. A.—"Device for protecting gas burners." No. 26,133.
I. G. Farbenindustrie Akt.-Ges.—"Low-temperature carbonization of fuels." No. 26,444.
I. G. Farbenindustrie Akt.-Ges.—"Production of combustible gases from granular fuels." No. 26,707.
I. G. Farbenindustrie Akt.-Ges.—"Gas producers." No. 26,708.
I. G. Farbenindustrie Akt.-Ges.—"Apparatus for purifying gases." No. 26,709.
Imray, O. Y.—"Gas producing plant." No. 26,322.
Kenny, W. R.—"Valve controlled pipelines, &c." No. 26,359.
Klonne, A. [Firm of], and Klonne, M.—"Sealing piston for reservoirs for storage of gas." No. 26,172.
Klug, H.—"Filters for gases." No. 26,230.
Kulzinski, M.—"Method of distilling solid fuels." No. 26,583.
Laing, B.—"Distillation of carbonaceous materials." No. 26,177.
Lulofs, W.—See Hanson, A. F. E. No. 26,721.
Masterton, W.—"Gas calorimeters." No. 26,630.
Morgan, P. B.—See Imray, O. Y. No. 26,322.
Neath, J.—See Gas Light and Coke Company. No. 26,495.
Nielsen, H.—See Laing, B. No. 26,177.
Oakley, P.—"Burners for gas cooking ovens." No. 26,379.
Pitkethly, R.—"Utilization of gas." No. 26,720.
Richardson, W. H.—See Oakley, P. No. 26,379.
Salerni, P. M.—"Distillation retorts." No. 26,488.
Siemens Schuckertwerke Akt.-Ges.—"Electric gas-purifying plant." No. 26,204.
Smedley, W. H.—"Gas heating appliances." No. 26,357.
Smith, T. A.—See Pitkethly, R. No. 26,720.
Spencer, S. E.—"Gas scrubbers." No. 26,019.
Staples, C. W.—See Glover & Co., Ltd., G. No. 26,660.
Stoves, Ltd.—See Oakley P. No. 26,379.
Wheeler, R. V.—"Treatment of hydrocarbon gases." No. 26,719.

[Extracted from the "Official Journal" for Oct. 19.]

Nos. 26,724—27,442.

British Brass Fittings, Ltd. "Gas taps." No. 27,144.
Collard, L. H.—"Device for cleaning gas." No. 27,241.
Cutler, E. E.—"Gasholders, and repair thereof." No. 27,393.
Davy, J. F.—"Gas heated cooking-apparatus." No. 27,334.
Frankfurter Gasges.—"Cooling coke." No. 27,346.
Hibberd, C. E.—"Gas meters." No. 27,340.
Hopwood, E. E.—"Suspension of illuminating lamps." No. 27,026.
I. G. Farbenindustrie Akt.-Ges.—"Process for treating coke oven gas." No. 27,202.
Parkinson Stove Company, Ltd.—See Davy, J. F. No. 27,334.
Petersen, H.—"Means for contacting gases and liquids." No. 26,852.
Robertson, T.—See Hibberd, C. E. No. 27,340.
Rook, F.—See Cutler, E. E. No. 27,393.
Schumacher, E.—See Frankfürter Gasges. No. 27,346.
Sperryn, G. N.—See British Brass Fittlngs, Ltd. No. 27,144.
Stauber G.—"Sealing means for gas turbines." No. 27,194.
Tillmetz, F. P.—See Frankfürter Gasges. No. 27,346.

MISCELLANEOUS NEWS.

METROPOLITAN GAS COMPANIES' OFFICIAL TESTINGS.

The Gas Referee's Reports of the official testings for the past quarter give the following average calorific values for the gas supplied by the Metropolitan Companies named:

Commercial Gas Company.—485·3 B.Th.U. from July 1 to Sept. 26, and 511·9 B.Th.U. from Sept. 27 to Sept. 30 (declared calorific value, 475 B.Th.U. from July 1 to Sept. 26 and 500 B.Th.U. from Sept. 27 to Sept. 30).

Gas Light and Coke Company.—502·4 B.Th.U. (declared calorific value, 500 B.Th.U.).

South Metropolitan Gas Company.—562·6 B.Th.U. (declared calorific value, 560 B.Th.U.).

South Suburban Gas Company.—503·6 B.Th.U. (declared calorific value, 500 B.Th.U.).

Tottenham District Light, Heat, and Power Company.—500·6 B.Th.U. (declared calorific value, 500 B.Th.U.).

Wandsworth, Wimbledon, and Epsom District Gas Company.—472·5 B.Th.U. (declared calorific value, 470 B.Th.U.).

BRILLIANT MORPETH.

The Lights that Shine.

[From the "Morpeth Herald."]

On the day this article was published, there was, about 8 p.m., a total failure of electricity in the borough, which continued for about twenty hours.

One of the first things to impress those from the provinces on visiting London a few years ago was the extraordinarily well-lighted streets after dark. In the principal thoroughfares night was turned into day in reality; and if the weather happened to be overcast it was not so difficult to find one's way about at night as it was during the period of natural light. To-day London cannot be classed as the only city which possesses good lighting, as there are now several cities and even small towns which have the advantage of well-lighted streets. Morpeth, for instance, can compare very favourably with any borough of its own size or larger; and with its situation on the Great North Road, the necessity of good and safe lighting is of paramount importance.

Certainly in recent years the lighting of the borough has been vastly improved, after very careful consideration and forethought on the part of the Manager and Directors of the Morpeth Gas Company. They have ever had before them the best interests of the inhabitants of the town, and the present very satisfactory lighting conditions at certain points is the outcome of practical tests and demonstrations. The Directors and Mr. Lockey a while ago visited the new installation of Sugg's "Littleton" mantle cluster system at Monkseaton, and being impressed with the advantages of the preheating of the gas before it enters the mantle, decided to recommend this type of lamp for important points.

The erection of this type of lamp in the Market Place and New Market met with the high approval of everyone; and encouraged by the success of their venture the Company decided to adopt the system and convert many of the other lamps to the same principle. Naturally the first places to receive attention were the chief routes through the town, and those used by the 'bus traffic; and with the approval of the Town Council, the Company decided to offer (without any additional cost to the ratepayers) to change the existing large lamps at ten corners to the preheated cluster type of burner, and thereby increase the lighting efficiency at those points. Two lamps in place of one on the column, Castle Square, were recommended, and later adopted with beneficial results, and on two routes where there used to be 10 lamps of 350 c.p. and 48 of 75 c.p., there now stand 4 of 600 c.p., 13 of 450 c.p., and 48 of 175 c.p. At the present time there are 200 lamps in Morpeth, the whole of which are supplied, maintained, lighted, and extinguished by the Morpeth Gas Company.

If a small borough like Morpeth has the "misfortune" to be situated on a road which the Ministry of Transport classes "A 1," the lighting of such a road through a town should be equally classed "A 1." Then one is called upon to consider the cost of maintenance. Surely, if the Government contribute lavishly towards the upkeep of the roads running through towns like Morpeth, for the benefit of the road hog, a contribution should likewise be made towards the lighting, in order that the streets may be made safe for life and limb.

CAMBERWELL EXHIBITION OF LOCAL MANUFACTURES.

At the Camberwell Baths, Church Street, S.E., on Oct. 19, a three-day exhibition of local manufactures was opened, under the auspices of the Camberwell, Peckham, and Dulwich Chamber of Commerce, to emphasize the need for Camberwell people to buy goods locally which had been manufactured in the borough. The exhibition was of a most interesting character.

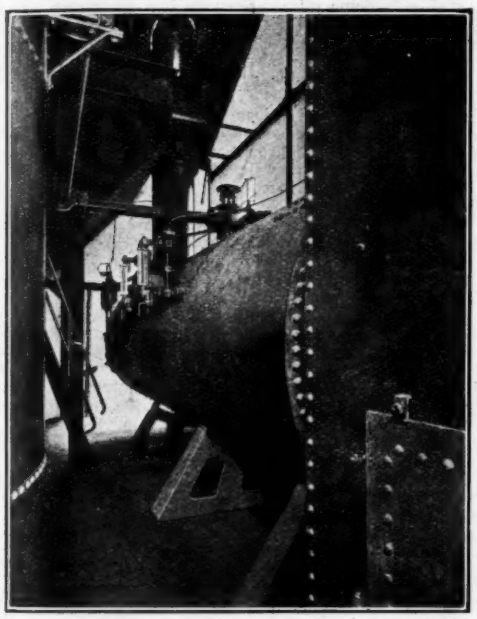
In opening the Exhibition, Sir Robert Burton Chadwick, M.P., Parliamentary Secretary to the Board of Trade, remarked that Britain had three great assets. One was the high integrity of British commercial practice, another was the high quality of British workmanship, and the third the blood tie of the people of the British Empire. In years gone by the North was always associated with manufacturing industries, but in later years the industries had gradually come South. He drew attention to the Merchandise Marks Act, which was passed in 1926. He felt that British salesmen preferred to sell British or Imperial goods to foreign ones; and the purchasers preferred to buy them. The Act was designed so that the purchaser could make a selection, and when the Act came into force he would know where the goods he wished to buy came from.

The South Metropolitan Gas Company occupied five stands out of a total of 45. A tasteful display of their new pattern coke-burning fires for room heating, which are fitted with gas burners for igniting the coke, were made a feature on two stands, and created much attention. Questions were invited as to the efficient use of coke for industrial and household purposes.

On two stands were the familiar "Metro" burners, gas fires, cookers, irons, &c. Admiration of the principle whereby a switch operates the gas light was freely expressed. To many visitors this was a new feature. On another stand were exhibits of disinfectant fluid, "Metro" wood preservative, "Metro" road tars, &c.

The exhibition was a great success.

KIRKE PATENT WASTE HEAT BOILERS *now working on* WATER GAS PLANTS



Photograph of a recent installation. The flue on right introduces the waste gases into the Kirke Waste Heat Boiler, and these are discharged at the other end of the boiler.

NOTE THESE POINTS:

COMPLETE COMBUSTION
of the "Blow" Gases.

NO PRIMING
because the boiler is horizontal.

NO LEAKAGE
at inlet tube-plate because scale cannot fall on the inlet tube-plate as in the case of a vertical boiler.

SAVING OF SPACE
because the boiler is elevated.

TUBES CAN BE EASILY CLEANED
on both sides.

Write to us for full particulars:

SPENCER-BONECOURT
LIMITED
PARLIAMENT MANSIONS, VICTORIA STREET, LONDON, S.W.1. 'Phone: VICTORIA 2802-3.

COURSE OF LECTURES AND DEMONSTRATIONS IN SMOKE INSPECTION.

In connection with the Public Health (Smoke Abatement) Act, 1926, which came into operation on July 1 of this year, the Ministry of Health, in their Circular No. 759, suggested that the officials responsible for the abatement of smoke nuisances should be specially qualified, and that there should be special courses of training.

In 1912 the Royal Sanitary Institute established an examination qualifying for the post of smoke inspector; and in order to assist candidates who are preparing for this examination, the Institute have arranged for a course of ten lectures covering the syllabus of the examination, and for practical demonstrations at works illustrating the management and working of different types of furnaces. The lectures, though primarily intended for smoke inspectors, are open to all interested.

The fee for the course is £1 10s.

Lectures.

At 6 p.m.

Fri., Nov. 4. The laws, by-laws, and regulations affecting the emission or prevention of smoke, and methods of procedure in dealing with offenders.
By Lawrence W. Chubb, Secretary of the Coal Smoke Abatement Society.

Mon., Nov. 7. The general principles underlying the production and transmission of heat; elementary chemistry of combustion.
By J. G. King, Ph.D., F.I.C.

Fri., Nov. 11. Fuels: Solid, liquid, gaseous; different kinds of coal in use; their attributes, the locality whence obtained; special fuels.
By J. G. King, Ph.D., F.I.C.

Mon., Nov. 14. Furnaces: the essentials of construction; various types in use; purposes for which they are used.
By R. J. Sarjant, A.R.C.S., M.Sc.

Fri., Nov. 18. Chimneys: Height, natural and artificial draught, and its measurement; composition and temperature of escaping gases. Proportion of carbonic acid as an indication of furnace efficiency.
By H. Hollings, M.Sc.

Mon., Nov. 21. Stoking: Principles and practice of stoking; mechanical stokers; other apparatus and appliances for improving combustion.
By Edward W. L. Nicol, Assoc.Inst.C.E., M.I.Mar.E., A.M.I.E.E

Fri., Nov. 25. Smoke: Nature and composition of; formation and predisposing causes; effects of various components of smoke on the atmosphere; vegetation and buildings.
By J. S. Owens, M.D., Assoc.M.Inst.C.E., F.G.S

Mon., Nov. 28. Smoke prevention in boiler and other furnaces, and in domestic fires; conditions of smokeless combustion, methods of estimating or measuring density and colour of smoke; smoke charts and instruments. Other gases, dust, and effluvia produced by combustion; their reduction and prevention.
By J. S. Owens, M.D., Assoc.M.Inst.C.E., F.G.S.

Fri., Dec. 2. A general knowledge of the various industries in which furnaces are used, or from which products of combustion are given off.
By J. S. Owens, M.D., Assoc.M.Inst.C.E., F.G.S.

Mon., Dec. 5. The main outlines of the application of gas, oil, and electricity for the production of power in various industries.
By J. S. Owens, M.D., Assoc.M.Inst.C.E., F.G.S.

Inspections and Demonstrations.

Arrangements have been made for the students to visit the following works and institutions where Lancashire boilers, hand-fired furnaces, mechanical stokers, firing with coke and other types of fuel under different loads, and methods for smoke prevention will be demonstrated.

Wed., Nov. 9, at 3 p.m. Visit to the Grove Road Power Station of the London Power Company, Lodge Road, St. John's Wood, N.W. 8. Conducted by Mr. B. Samuels.

Sat., Nov. 12, at 3 p.m. Visit to the L.C.C. County Hall, Westminster Bridge, S.E. 1. Conducted by Mr. Edward W. L. Nicol, Assoc.Inst.C.E., M.I.Mar.E., A.M.I.E.E.

Thurs., Nov. 17, at 3 p.m. Visit to Messrs. Charrington's Brewery, Mile End Road, E. 1. Conducted by Mr. E. H. Lowden.

Sat., Nov. 19, at 3 p.m. Visit to the Metropolitan Asylums Board Hospital, Tooting Bec Road, S.W. 17. Conducted by Mr. Edward W. L. Nicol, Assoc.Inst.C.E., M.I.Mar.E., A.M.I.E.E.

Wed., Nov. 23, at 3 p.m. Visit to Messrs. Manbre & Garton, Ltd., Winslow Road, Fulham Palace Road, Hammersmith. Conducted by the Chief Engineer, Mr. G. A. Renton.

Wed., Nov. 30, at 3 p.m. Visit to the Fuel Research Station of the Department of Scientific and Industrial Research, River Way, Blackwall Lane, East Greenwich, S.E. 10.

The Economic Gas Boiler Company has been registered, with a capital of £2000, to acquire two Burnley gas appliance manufacturers' businesses.

Employees' Charity.—Generous donations to Edinburgh institutions are made annually by the employees of Messrs. Alder & Mackay, Ltd. This year they gave to the Edinburgh Royal Infirmary £78 7s. 7d., to the Queen Victoria Jubilee Institute for Nurses £42 0s. 11d., and to the Sick Children's Hospital £45 19s. 7d.

ADMINISTRATION AT BELFAST.

The Belfast Gas Committee's reply to the report of the Special Committee on Economy and Efficiency, which conducted a three months' investigation into the working of every civic department, has been published. As mentioned in the "Journal" for Aug. 10, p. 343, the Investigation Committee had expressed the highest admiration for the efficient management of Mr. J. D. Smith, the Engineer, but had passed some rather severe strictures on features of the administration which Mr. Smith was not free to control.

The Gas Committee, in their replying document, state their gratification at, and cordial agreement with, the tribute to the Manager. They agree that the inequitable application of the clerical grading scheme greatly increased the expenses of the Department without in any way adding to its efficiency, and believe that a grading scheme providing for 1st, 2nd, and 3rd grade clerks is better adapted to the needs of a trading department than is the existing system. They endorse the recommendation to increase the salaries of the following officers by the amounts stated: Mr. Robert Boyd, Accountant, £100; Mr. Arthur Magowan, Engineer's Secretary, £150; Mr. Hugh H. Orr, Works Manager, Chemical Dept., £200; and Mr. Frank Moore, Manager, Stove Dept., £100.

With regard to the better utilization of the collectors' services, the Gas Committee state that they will try the experiment of furnishing their accounts by post. The matter has been discussed from time to time by the management, and there are advantages and disadvantages attached to this method of delivery. The Committee believe that the salaries of the collectors are not too high. This remark applies in even greater measure to the salaries of the cash office staff. The Gas Committee feel, however, that the payment of the same salary to assistant rental clerks as is paid to rental clerks is an arrangement susceptible to criticism. While the salaries of the rental clerks and the assistant clerks were under the control of the Committee, an appreciable difference was always maintained; and the Committee hold that such a difference is desirable.

The Gas Committee have already saved the salaries of one collector, one rental clerk, and two assistants through the introduction of the "Addressograph" machine. The management is continuing the experiment, which the Gas Committee authorized in August, 1926, and will shortly be in a position to recommend the placing of all the rental department's work on a machine basis, involving a reduction in the present rental staff of probably five persons. The question has been raised as to what is to become of those members of the staff who are displaced by the adoption of machine methods; but the gradual retirement of the older officers, coupled with the steady growth of the undertaking, and the multiplication of its activities in its various sections, can, it is stated, be trusted to absorb any surplus.

The report goes on to say that it cannot be too strongly emphasized that no section of the Gas Department is at present overstaffed. The relief provided by the introduction of the "Addressograph" machine does not extend to making out and otherwise completing the accounts; and unless and until the whole of the work is reorganized on a modern machine basis, no reduction in the rental staff is practicable or contemplated. The problem before the management, therefore, is of a dual nature, involving, on the one hand, the building up of a carefully considered machine system, and, on the other, the carrying-on of the existing system till the new one is perfected. The Gas Committee believe that their officers, who have initiated and carried the experiment in machine working to its present stage, should be permitted to complete it without interference, and that the completed scheme will vindicate the methods of careful trial and experiment that have been applied to the solution of a variety of problems, and will result in far-reaching improvement.

The Committee recommend that all ordinary inspectors appointed since 1919 should have their salaries reduced. They also recommend that all inspectors appointed in future should be placed on the wages list. The same thing applies to the prepayment meter staff.

TRADE NOTES.

Wholesale Fittings Company's New Showroom.

The Wholesale Fittings Company, Ltd., of Commercial Street, E.1, have opened a new showroom at Manchester, the address of which is "Clydesdale House," Turner Street, High Street, Manchester.

"High Peak" Gas Fires.

General Gas Appliances, Ltd., of Guide Bridge, Manchester, have published a catalogue illustrating in colours their "High Peak" series of art metal gas fires. The design and the finish of these fires are extremely attractive.

Drakes' Vertical Retorts for Conway.

The Conway Gas Undertaking have placed with Messrs. Drakes, Ltd., of Halifax, the order for the vertical retort plant for their proposed new works, subject to the approval and sanction of the Ministry of Health. The order embraces a steel house to accommodate a vertical retort plant consisting of three beds of four retorts. Each retort has a nominal capacity of 3 tons of coal per diem. A lift and coal handling plant are incorporated. In addition, the Council have entrusted Messrs. Drakes with an order for a vertical cast-iron water-cooled condenser of a capacity of 500,000 c.ft. per day.

Nottingham Gas Profits.—The Labour Party, who, at the forthcoming municipal elections, will contest most of the seats in Nottingham, are making a prominent feature in their programme of a demand for the abolition of the allocation in relief of rates of profits accruing from the city's trading concerns, of which the principal is the gas undertaking. The policy of the gas concern, they state, should be to sell gas at the lowest price, not to make a profit.

COAL TRADE REPORTS.

From Our Own Correspondents.

NORTH-EAST COAST.

The market has undergone considerable change in sentiment. There is greater volume in prompt trade, and buyers are giving more consideration to forward business. The reasons for this are difficult to assign, but last week's strike among German brown coal workers probably had some influence. The market is hopeful that this may be the beginning of better times, though the grounds at present are not very substantial.

Durham steams and coking are the best features. The latter are active, and the price is 3d. to 6d. higher. Gas coals are better, and are booked for prompt. Wear Specials and bests are 16s.; while seconds are firmer at 13s. 6d. to 14s. Gas coke is in good demand at 22s. to 23s. for November shipment.

YORKSHIRE AND LANCASHIRE.

The demand for domestic fuel in Yorkshire and Lancashire continues on the quiet side, and the anticipated volume of business has not materialized. Some prices are easier in consequence. The situation at the majority of collieries is causing some anxiety.

Industrial coal is not in sufficient request to lead to regular working hours, many pits being overstocked with small nuts and slack. These have been discounted extensively without finding many purchasers for stocking purposes. There is a decided opinion among many large consumers that values will still further decline.

With the continued absence of export orders, coupled with the low figures which operated throughout the summer for renewed gas contracts, many pits are now faced with difficult problems unless there should be a decided improvement in the prices they can obtain for their screened household coal.

The following are the Humber bunker and export prices, f.o.b. usual shipping ports: South Yorkshire—Hards, Association, 16s. 9d. to 17s. 3d.; screened gas coal, 16s. to 17s.; washed trebles, 16s. 6d. to 17s.; washed doubles, 15s. to 15s. 6d.; washed singles, 15s. to 15s. 3d.; washed smalls, 11s.; rough slack, 9s. 3d. to 9s. 6d.; smithy peas, 17s. to 18s. per ton. West Yorkshire—Hartley's (f.o.b. Goole), 14s. 6d. to 15s. 6d.; screened gas coal, 14s. 6d. to 15s. 6d.; washed trebles, 16s. 6d. to 17s.; washed doubles, 15s. to 15s. 6d.; washed singles, 15s. to 15s. 3d.; washed smalls, 10s. 3d. to 10s. 9d.; unwashed trebles, 15s. 6d. to 16s.; unwashed doubles, 11s. to 11s. 6d.; rough slack, 9s. 3d. to 9s. 6d.; coking smalls, 9s. to 9s. 6d. per ton. Derbyshire and Nottinghamshire—Top hards, 17s. 3d. to 18s. 6d.; washed doubles, 16s. to 16s. 3d.; washed singles, 15s. 3d. to 15s. 6d.; washed smalls, 10s. 6d. to 11s.; rough slack, 9s. 3d. to 9s. 6d. per ton. Yorkshire, Derbyshire, and Nottinghamshire—Screened steam coal, 14s. 6d. to 15s. 3d.; gas coke, 22s. to 23s. 6d.; furnace coke, 19s. to 20s. per ton.

Average quotations in Lancashire: Lancashire best house coal, 31s. to 32s.; seconds, 25s. to 26s.; common, 19s. to 21s.; kitchen, 22s. to 24s.; Yorkshire best selected house, 32s. to 35s.; best house, 29s. to 30s.; seconds, 19s. to 20s.; washed doubles, 13s. to 14s. 6d.; washed singles, 8s. to 9s.; rough slack, 7s. 6d. to 8s. 6d. per ton in wagons at the pit.

MIDLANDS.

The market has remained remarkably inert. Little has come of the expected development of the seasonal demand for house coals. Collieries are glad to make deals at 2s. to 2s. 6d. below the new list prices for certain grades. It is only in exceptional cases that they are able to enforce an advance on the September rates.

While the indifference of the householder is a factor in the situation, the main cause of weakness is the unresponsiveness of industrial consumption. No improvement can be discerned in the absorption of steam coals and other descriptions of works fuel.

The requirements of electricity undertakings are on an expanding scale; but with the market over-supplied in every direction, the difference is imperceptible. Gas engineers are unable to consider many of the offers of low-priced spot lots which are put before them because their storage accommodation is still taxed to its utmost limits in a great many instances, and the slackness of trade off-sets the seasonal increase in the lighting load.

Prices generally remain where they were a month ago, save in the case of special qualities of house coals, which are obtainable only in limited quantities. So far from progressing towards a more satisfactory equilibrium smalls are obtainable at lower prices by buyers who are in a position to avail themselves of the collieries' dilemma. Nutty slacks have changed hands at 5s. at the pithead.

There is no recovery in coke.

Montevideo Gas Company.—The Directors of the Montevideo Gas and Dry Dock Company, Ltd., have declared an interim dividend on the ordinary stock of the Company for the half-year ended June 30 of 2½ p.ct. (actual), free of income-tax, payable on Dec. 1—the same as in the previous year.

Kenilworth Gas Company.—The final meeting of stockholders of the Kenilworth Gas Company was held recently, when several of those present voiced their disapproval of the scheme submitted by the Directors for the division of the assets of the Company. Alderman J. C. Purser, of Warwick, expressed the opinion that the Directors had been over-generous to themselves, but not to the officials. He suggested that they should voluntarily reduce their compensation allowances and increase those of the officials. Mr. Morris intimated that the Board had sufficient proxies to carry the resolution. Mr. Nixon, another Director, declined to vary the proposed allocations, and said that they were just and generous. The Chairman (Mr. H. Miles), on putting the resolution, asked for a show of hands, but not a single vote in favour was recorded. When he asked for a show of hands against, he again found an unresponsive meeting. The resolution was therefore carried *nem. con.*

STOCK MARKET REPORT.

ON the Stock Exchange last week there was a steady demand for the leading gilt-edged securities. The most prominent was the 3½ p.ct. Conversion Loan, which at 75⅜ has now reached the price at which it stood prior to the recent conversion offer. The 5 p.ct. War Loan, which will go *ex* div. this week, was also in demand. The appearance of new issues naturally affected the number of transactions; but the optimism of the Corporations with regard to market values was not justified, and the Smethwick and the Birkenhead issues were mainly left in the hands of the underwriters. A similar fate is foreshadowed for the Tynemouth issue. Dealings in the South African loan and the Brazilian Bonds are at a small premium; but the Polish loan, which was only just subscribed, is quoted at a discount. The unexpected Victoria Government loan was more attractive, and is expected to be oversubscribed.

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf.Yr	Dividends. Last Hf. Yr.	NAME.	Quotations. Oct. 21.	Rise or Fall on Week.	Transactions. Lowest and Highest Prices.
£			%p.a	% p.a.				
171,978	Stk.	Sept. 8	5	5	Aldershot 5 p.c. max. C. .	68—73	..	..
323,992	,,	,,	4	4	Do. 4 p.c. Pref. . .	67—70	..	..
1,851,888	,,	Sept. 29	7	7	Alliance & Dublin Ord. .	85—88	+1	86
274,000	,,	July 14	4	4	Do. 4 p.c. Deb. . .	64—67	..	..
532,654	,,	Aug. 25	—	7	Barnet Ord. 7 p.c. . . .	103—105	..	104
800,000	1	Oct. 13	1/7½	1/7½	Bombay, Ltd.	21/—23/-*	..	..
170,000	10	Aug. 25	8½	8½	Bournemouth 5 p.c. . . .	12½—13½	..	..
500,050	10	,,	7	7	Do. B 7 p.c. . .	12—13½	..	..
275,000	10	,,	6	6	Do. Pref. 6 p.c. .	10⅞—11½	..	..
50,000	Stk.	June 29	3	3	Do. 3 p.c. Deb. .	55—58	..	..
163,025	,,	,,	4	4	Do. 4 p.c. Deb. .	74—77	..	..
337,900	,,	Aug. 25	—	7½	Brighton & Hove 6 p.c. Con.	104—107	+1	105
341,800	,,	,,	—	6/8/6‡	Do. 5 p.c. Con.	93—96	+1	..
1,397,500	,,	July 28	5	5	Bristol 5 p.c. max. . . .	85½—86¼a	..	..
885,000	,,	Sept 29	7	8	British Ord.	108—111	..	..
100,000	,,	June 29	7	7	Do. 7 p.c. Pref. . .	114—117	..	..
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb. .	74—77	..	..
200,000	,,	,,	—	33/2	Do. 5 p.c. Red. Deb. .	94—96	..	..
100,000	10	May 26	6	8	Cape Town, Ltd. . . .	7½—8½	..	..
100,000	10	Apl. 28	4½	4½	Do. 4½ p.c. Pref. . .	6—7	..	6½
150,000	Stk.	June 29	4½	4½	Do. 4½ p.c. Deb. . .	70—75	..	..
886,860	,,	July 28	6	6	Cardiff Con. Ord. . . .	100—103	..	..
287,860	,,	June 29	7½	7½	Do. 7½ p.c. Red. Deb. .	100—103	..	..
187,150	,,	Aug. 11	6½	5	Chester 5 p.c. Ord. . .	87—92b	..	..
79,185	1	Oct. 13	1/-	1/-	Colombo Ltd. Ord. . . .	28/—30/-*	..	..
84,495	1	,,	1/4‡	1/4‡	Do. 7 p.c. Pref. .	20/—22/-*	..	..
221,490	1	Oct. 13	1/9‡	1/9‡	Colonial Gas Assn. Ld. Ord.	24/—26/-*	..	..
173,900	1	,,	1/7‡	1/7‡	Do. 8 p.c. Pref.	20/—22/-*	..	..
2,073,280	Stk.	July 14	—	5	Commercial Ord.	89—91	+1	88—90
475,000	,,	June 16	3	3	Do 3 p.c. Deb. .	56—59	+1	58
930,000	,,	Sept. 29	‡1	‡1	Continental Union, Ltd. .	30—35	..	30½
200,000	,,	,,	7	7	Do. 7 p.c. Pref. .	82—84	..	..
787,580	,,	Aug. 11	6½	6½	Croydon sliding scale . .	97—100	..	99—100
492,190	,,	,,	5	5	Do. max. div. . . .	80—83	..	..
493,273	,,	Aug. 25	9	6	Derby Con.	103—105e	..	..
55,000	,,	June 29	4	4	Do. Deb.	73—75e	..	..
200,000	,,	Aug. 25	5	5	East Hull Ord. 5 p.c. . .	78—81	..	..
50,000	,,	June 16	5	5	Eastbourne 5 p.c. Deb. .	90—95	..	..
1,009,180	10	Sept. 29	‡3	‡4	European, Ltd.	6½—6⅝	..	6⅝—6⅝
18,747,460	Stk.	July 28	5	5	Gas Light & Coke 4 p.c. Ord.	90—92	..	90½—91⅝
3,000,000	,,	,,	8½	8½	Do. 8½ p.c. max. . . .	60—62	..	62
4,197,080	,,	,,	4	4	Do. 4 p.c. Con. Pref. .	75—77	..	76⅞—77½
6,522,630	,,	June 16	3	3	Do. 3 p.c. Con. Deb. .	59—61	+1	59½—60½
181,315	,,	,,	6	5	Do. 5 p.c. Br'tf'd Rd. Db.	102—105	..	..
1,642,770	,,	,,	5	5	Do. 5 p.c. Red. Deb. .	99—101	..	100½—100⅝
42,000	,,	—	7½	7½	Do. 7½ p.c. Ilford Deb. .	..	..	..
82,500	,,	Aug. 25	6½	6½	Hastings & St L. 5 p.c. Conv	88—91	..	..
268,740	,,	,,	5½	5½	Do. 5½ p.c. Conv.	69—72	..	..
70,000	10	Oct. 13	†10	†10	Hongkong & China, Ltd. .	12—13*	..	..
178,800	Stk.	Aug. 25	5	5	Hornsey Con. 5½ p.c. . .	65—68	..	..
1,976,000	,,	May 12	10	10	Imperial Continental Cap.	143—146	+1	143½—146
393,130	,,	Aug. 11	8½	8½	Do. 8½ p.c. Red. Deb.	68—70	..	..
335,242	,,	Aug. 11	6½	7	Lea Bridge 5 p.c. Ord. . .	94—97	..	..
2,146,907	,,	Aug. 11	5½	5½	Liverpool 5 p.c. Ord. . .	85½—86b	+½	86
600,000	,,	Sept 29	7	7	Do. 7 p.c. Red. Pref.	101—103b	..	..
168,786	,,	Aug. 25	8	9	Maidstone 5 p.c. Cap. . .	107—112	..	..
68,480	,,	June 16	3	3	Do. 3 p.c. Deb. . .	52—55	..	..
75,000	5	June 16	†7	†8	Malta & Mediterranean .	5½—5⅝	..	..
641,920	Stk.	May 26	†5	†7	Montevideo, Ltd. . . .	91—93	..	..
2,061,315	,,	July 28	5	5	Newcastle & Gateshead Con.	76¼—77¼d	..	..
860,929	,,	,,	4	4	Do. 4 p.c. Pref. .	69¼—70¼d	..	..
691,705	,,	June 29	8½	8½	Do. 8½ p.c. Deb. .	66¼—67¼d	..	..
131,785	,,	Aug. 25	—	6/18/0	North Middlesex 6 p.c. Con	93—96	..	..
800,000	,,	Apl. 28	9	7	Oriental, Ltd.	100—102	..	..
188,120	,,	June 29	7½	7½	Plym'th & Ston'house 5 p.c.	102—107	..	..
414,500	,,	Aug. 25	7½	7½	Portsm'th Con. Stk. 4p.c. Std.	102—105	..	..
326,732	,,	,,	5	5	Do. 5 p.c. max	76—79	..	..
2,989,909	1	—	—	—	Primitiva Ord.	20/—21/-	+2/-	18/9—21/-
282,200	100	June 1	4	4	Do. 4 p.c. Red. Deb. . .	84—86	..	..
600,000	Stk.	July 28	4	4	Do. 4 p.c. Red. Deb. 1911	72—74	..	..
434,963	,,	June 29	—	4	Do. 4 p.c. Cons. Deb. . .	72—74	..	74
150,000	10	Sept. 29	6	6	San Paulo 6 p.c. Pref. . .	7⅞—8¼*	..	8¼
125,000	50	June 29	5	5	Do. 5 p.c. Red. Deb.	47—49	..	..
270,000	Stk.	Sept. 8	5⅜	5⅜	Sheffield A	101—103e	+2	..
419,968	,,	,,	5⅜	5⅜	Do. B	101—103e	+2	..
1,047,000	,,	,,	5⅜	5⅜	Do. C	101—103e	+2	..
90,000	10	May 26	4	6	South African	4—6	..	..
6,609,895	Stk.	Aug. 11	7	5	South Met. Ord.	102—104	..	102—103½
500,000	,,	—	—	—	Do. 6 p.c. Irred. Pf.	110—113	..	111
1,895,445	,,	July 14	3	3	Do. 3 p.c. Deb. . .	57—60	..	..
734,000	,,	Sept. 8	6½	6½	Do. 6½ p.c. Red. Db.	101—103	..	102½—103
91,500	,,	Aug. 11	8½	8½	South Shields Con. . . .	101—103d	..	..
1,343,795	,,	July 28	6½	6½	South Suburban Ord. 5 p.c.	102—105	..	104
368,837	,,	June 16	5	5	Do. 5 p.c. Deb.	93—96	..	95
647,740	,,	Sept. 8	5	5	South'mpton Ord. 5 p.c. max	75—78	..	76½—76⅞
121,275	,,	June 29	4	4	Do. 4 p.c. Deb	73—76	..	..
250,000	,,	Aug. 25	7	7	Swansea 7 p.c. Red. Pref. .	103—106	+3½	104½—105
200,000	,,	June 16	6½	6½	Do. 6½ p.c. Red. Deb.	100—102	..	..
120,000	,,	July 28	7½	7½	Tottenham District A 5 p.c.	105—108	..	..
689,275	,,	,,	6½	6½	Do. B 5½ p.c.	89—92	..	..
150,000	,,	,,	5½	5½	Do. 5½ p.c. Pref.	95—98	..	..
181,255	,,	June 16	4	4	Do. 4 p.c. Deb.	72—75	..	..
258,251	,,	Sept. 29	5	5	Tynemouth Con. and New	81—83d	..	..
389,094	,,	Aug. 25	6½	6½	Uxbridge, Maidenhead, & Wycombe 5 p.c. . . .	85—90	..	..
86,880	,,	,,	5	5	Do. 5 p.c. pref. .	83—88	..	87
					Wandsworth, Wimbledon, and Epsom—			
80,000	,,	July 14	8½	8½	Wandsworth A 5 p.c. .	117—122	..	..
355,686	,,	,,	7	7	Do. B 5½ p.c. .	100—105	..	..
423,585	,,	,,	5/19/0	5/19/0	Do. C and New	88—93	..	..
889,000	,,	,,	6⅝	6⅝	Do. Wimbledon 5 p.c. .	98—103	..	..
98,000	,,	,,	7½	7½	Do. Epsom 5 p.c. . .	100—105	..	..
200,000	,,	,,	5	5	Do. 5 p.c. Pref . . .	85—90	..	..
88,416	,,	June 29	8	8	Do. 8 p.c. Deb. . . .	55—58	..	..
284,743	,,	,,	4	4	Do. 4 p.c. Deb. . . .	74—77	..	..

Quotations at:—*a.*—Bristol. *b.*—Liverpool. *c.*—Nottingham. *d.*—Newcastle *e.*—Sheffield. * Ex. div. † Paid free of income-tax. ‡ For year.

Considerable fluctuations took place in the more prominent Industrials. Artificial Silks, Tobaccos, and Gramophones were most affected. The principal differences during the week were a drop of 28s. 9d. in British Celanese and a jump of 23s. 9d. in Gramophones.

The week has been a very satisfactory one in the Gas Market, all the markings being in an upward direction. Commercial ordinary again advanced 1 point to 89-91. Many large orders have been placed for this stock; and it is expected the price will improve still further. Primitiva shares have at last reached par value, and in fact transactions were recorded at 1s. premium. The biggest advance, however, was 3½ points in the Swansea 7 p.ct. redeemable preference, which at the average price of 104½ realizes £6 14s. p.ct.

The following transactions were recorded during the week:

On Monday, Brighton and Hove 6 p.ct. 105, Commercial 88, European 6 7/16, 6½, Gas Light and Coke 90⅞, 91, 91¼, 91⅛, 91⅜, 4 p.ct. preference 77, 3 p.ct. debenture 59½, 59⅝, 59⅜, 5 p.ct. debenture 100⅛, 100⅛, 100⅝, Imperial Continental 145, Primitiva 18s. 9d., 18s. 10½d., 19s., 19s. 1½d., 19s. 3d., 19s. 4½, 19s. 6d., South Metropolitan 102⅛, 102⅜, 103¼, 6½ p.ct. debenture 102¼, South Suburban 5 p.ct. debenture 95, Uxbridge 5 p.ct. preference 87. Supplementary prices, Montevideo 6 p.ct. debenture 98⅜.

On Tuesday, Commercial 3 p.ct. debenture 58, Croydon sliding-scale 99, European 6⅜, 6⅝, Gas Light and Coke 91, 91⅛, 91⅜, 4 p.ct. preference 76½, 76⅜, 77, 3 p.ct. debenture 59½, 60, 5 p.ct. debenture 100⅛, 100⅝, Primitiva 19s., 19s. 3d., 19s. 4½d., 19s. 6d., 19s. 7½d., 19s. 9d., 20s., South Metropolitan 102⅜, 103. Supplementary prices, Gas Light and Coke, Brentford 6 p.ct. 99½, Hampton Court 5 p.ct. 102, Southgate and District 7 p.ct. 101⅜, 102½.

On Wednesday, Barnet 7 p.ct. maximum 104, Bristol 5 p.ct. maximum 85⅜, Commercial 88½, 90, Croydon sliding-scale 100, European 6 9/16, Gas Light and Coke 91, 91⅛, 91¼, 91⅜, 3½ p.ct. maximum 62, 4 p.ct. preference 77, 3 p.ct. debenture 60½, 5 p.ct. debenture 100⅛, 100⅝, Imperial Continental 144, Primitiva 20s., 20s. 1½d., 20s. 3d., 20s. 4½d., 20s. 6d., 4 p.ct. consolidated debenture 74, South Metropolitan 102, 103½. Supplementary prices, Metropolitan (of Melbourne) 9⅜, 9½.

On Thursday, Bristol 5 p.ct. maximum 85⅜, Cape Town 4½ p.ct. preference 6⅝, Commercial 89, 90, European 6 7/16, 6½, 6 9/16, Gas Light and Coke 90⅞, 91, 91⅛, 91⅜, 91½, 4 p.ct. preference, 76⅛, 77½, 3 p.ct. debenture 60, 5 p.ct. debenture 100½, Imperial Continental 143½, 145, Primitiva 20s., 20s. 4½d., 20s. 6d., 20s. 7½d., 20s. 9d., 20s. 10½d., 21s., South Metropolitan 6 p.ct. preference 111½, 6½ p.ct. debenture 103, South Suburban 5 p.ct. 104, Southampton 5 p.ct. maximum 76½, 76⅜. Supplementary prices, Bristol 4 p.ct. new debenture 71½.

On Friday, Alliance and Dublin 86, Bristol 85½, Continental Union 30½, Gas Light and Coke 90⅞, 90⅝, 91, 4 p.ct. preference 76⅜, Imperial Continental 145, 146, Primitiva 20s., 20s. 3d., 20s. 4½d., 20s. 6d., 20s. 7½d., 20s. 9d., San Paulo 6 p.ct. preference 8¼, South Metropolitan 102⅜, 102¾, 103¼, 6 p.ct. preference 112½, 6½ p.ct. debenture 102¾, Swansea 7 p.ct. preference 104⅞, 105. Supplementary prices, Malta and Mediterranean 7 p.ct. 1st preference 5 1/16, 5⅛, Walton-on-Thames and Weybridge "B" 10⅛, 10½.

Easy conditions prevailed in Lombard Street at the end of the week. The rate for new and old loans was 3½ p.ct., but balances were obtainable towards the close at 3 p.ct. The discount market was not affected by the Treasury Bill result. £40,000,000 were allotted at an average rate of £4 6s. 1·19d. p.ct., or about 3½d. p.ct. below the previous week's rate. This week's offer will be £45,000,000.

Foreign Exchange movements were usually narrow. The dollar-sterling was firmly maintained, and closed unaltered at 4.87 7/16. Belgas depreciated slightly to 34.99½; Spanish pesetas improved to 28.26; and French francs were unchanged at 124.

Silver was easier on Chinese sales, the price declining to 25⅜d. per oz.; while Gold advanced ½d. to 84s. 11½d. per oz.

The Bank Rate is 4½ p.ct., to which it was reduced from 5 p.ct. on April 21. The Banks' deposit rate is 2½ p.ct., and the deposit rates of the discount houses are 2½ p.ct. at call and 2¾ p.ct. at notice.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

London, *Oct.* 24.

There is rather more inquiry for pitch, and the price is steady at about 87s. 6d. per ton net in bulk.

Creosote continues firm at 8¾d. to 9d. per gallon.

Tar spirits are unchanged; pure benzole being 1s. 5d. to 1s. 6d. per gallon, pure toluole about 1s. 10d. to 1s. 11d. per gallon, 95/160 solvent naphtha 1s. 3d. per gallon, and pyridine 6s. to 6s. 6d. per gallon.

Tar Products in the Provinces.

Oct. 24.

The average prices of gas-works products during the week were: Gas-works tar, 61s. to 66s. Pitch—East Coast, 84s. to 85s. f.o.b. West Coast—Manchester, 79s. to 80s.; Liverpool, 82s. to 82s. 6d.; Clyde, 83s. to 84s. Benzole, 90 p.ct., North, 1s. 1d. to 1s. 2d.; crude, 65 p.ct. at 120° C., 10d. to 10½d., naked at makers' works; 50/90 p.ct., naked, North, 1s. 3d. to 1s. 4d. Toluole, naked, North, 1s. 4d. to 1s. 5d. nominal. Coal-tar crude naphtha, in bulk, North, 7¼d. to 8d. Solvent naphtha, naked, North, 9½d. to 10d. Heavy naphtha, North, 10d. to 1s. Creosote, in bulk, North, liquid, 7½d. to 7⅝d.; salty, 7⅜d. to 7½d.; Scotland, 7½d. to 7⅝d. Heavy oils, in bulk, North, 8¾d. to 9¼d. Carbolic acid, 60 p.ct., 2s. 4d. to 2s. 5d. prompt. Naphthalene, £11 to £14; salts, £5 to £5 10s., bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality unsaleable.

CONTRACTS OPEN.

Coal.

The Gas Committee of the Corporation of Lytham Saint Annes are inviting tenders for the supply of gas coal. [See advert. on p. 279.]

EXTENSIONS.

Purifiers for Omagh.

The Home Affairs Ministry of Northern Ireland have sanctioned a loan of £3000 to the Omagh (co. Tyrone) Urban Council, to enable them to provide new purifiers at the gas-works.

Carbonizing Plant at Dewsbury.

We learn from Mr. Henry L. Bateman, Engineer and Manager, that the Ministry of Health have approved the proposed extensions to the carbonizing plant at the gas-works of the County Borough of Dewsbury.

Reconstruction at Clitheroe.—The Clitheroe Town Council, on Oct. 18, decided to apply for powers to borrow £60,000 to carry out their gas-works reconstruction scheme. An amendment that only £36,000 be asked for was defeated. It was stated that the smaller amount covered only the modernization of the gas-making plant, now considered obsolete, while the larger sum provided for a new gasholder, purifiers, and scrubbers.

More Gas Consumed at Keighley.—The financial statement of the Keighley Corporation Gas Department for the year ended June 30 shows a net profit of £4009. The Committee recommend that £1134 be transferred from the reserve and renewals fund account, that £4894, being the estimated cost of public gas lighting, be transferred to the relief of the general district rate, and that a donation of £250 be made to the Keighley Victoria Hospital. In reviewing the results of the year, the Manager (Mr. A. Bromley) says the consumption still increases. This is due to the demand for gas for cooking, &c. During the year the number of cookers on hire increased by 277. The hire-purchase system has been the means of bringing into use 504 additional cookers, heating stoves, and water boilers. A total of 722 cookers, heaters, &c., has been sold.

The annual report of Bolton's Medical Officer has an illuminating comment on the smoke nuisance. He declares that its radical cure will only be found in the use of gas, electricity, and a smokeless fuel, when the latter can be produced at an economic price.

A number of gas meters and other stock were destroyed through a fire on Thursday at the premises of Messrs. Willey & Co., gas engineers, of Valley Street, North Darlington. The test-room, which contained valuable equipment, was fortunately untouched; but the damage is estimated to amount to several hundred pounds.

The Doncaster Corporation Gas Department are preparing to hold an exhibition in the Guild Hall, from Nov. 2 to 10, in connection with the celebration of the centenary of gas supply in the town. There will be cookery demonstrations and lectures each afternoon and evening, and interesting historical and modern gas appliance exhibits.

The Ellesmere Port Urban Council lately organized a gas exhibition at Little Sutton, when modern appliances were on view. It was opened by Mr. J. H. Coulter (the Chairman of the Little Sutton Council), who said it was evident that great progress was being made in the provision of gas for the people. Miss Sketchley gave demonstrations in cooking throughout the week.

Some 170 employees of the Preston Gas Company had a dinner and concert on Oct. 19, as the outcome of a suggestion made at the annual trip last July. Every department was represented, under the Chairmanship of Mr. S. Tagg, J.P. Mr. F. J. Newbound (Secretary) and Mr. W. Heald (Works Manager) also attended. The Chairman emphasized the value of good fellowship and the co-operative spirit among the workers.

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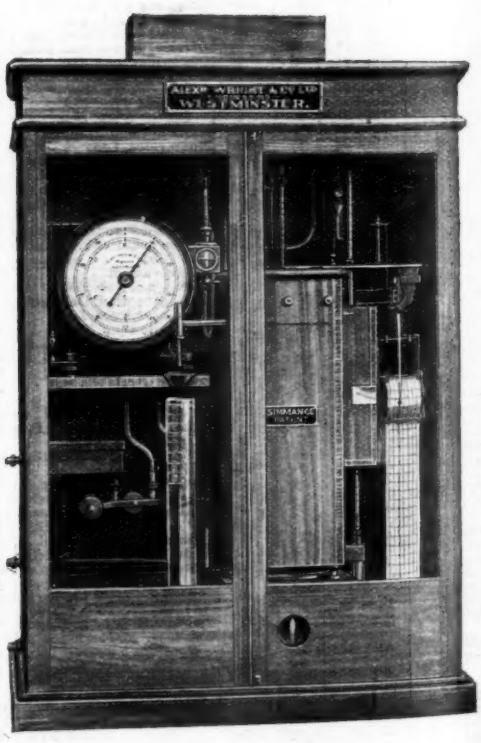

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